Traffic Quarterly

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Driving Tests – for Today

Our confused procedure of qualifying and disqualifying drivers is unavailing.

We make a point of classifying roads. Highway laws and the distribution of funds are based on this classification.

Because of different types of roads, their location and effect on rates of travel, road-speeds are posted from fifteen to eighty miles an hour. This wide variation frequently originates with an unqualified local authority who has little, if any, consideration for the class or purpose of the road. These decisions on travel rates are totally unrelated to driver-competence or attitude. They take no account of the mechanical efficiency of cars.

Highway postings only partly accomplish their intended purpose. To some drivers they serve as an aid or a caution. To others they serve as a challenge. They are an invitation to safe driving, appreciated by the good driver and frequently ignored by the willful one.

Unfortunately, with marked progress in automotive engineering and the effort to better our highways to provide safe and efficient transportation, little has been done to improve driver qualification.

In this age of progress and specialization, it is unrealistic to issue an operator permit to an applicant conspicuously unqualified to drive, who, fully aware of his incapabilities, recognizes the misplaced judgment. This type of examination offers false encouragement, less safety, and little incentive for improvement.

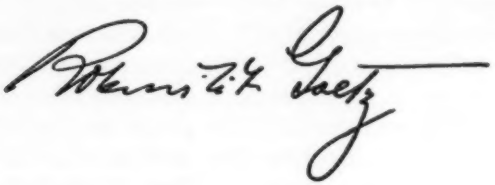
Judgment and attitude are difficult to measure and foresee. Driving is an essential national activity. Authority to drive is easy to acquire but driving is difficult to control.

We should replace our complacency with a rigorous system of licensing to gain public respect for our effort and appreciation for the privilege of driving. Authority to drive will then be eagerly sought and zealously cherished.

The elementary form of examination currently used throughout the country falls far short of qualifying the freshman driver to meet the immediate difficult driving situations he will soon encounter.

In the absence of essential records, it would be difficult to say how many drivers would fail to qualify in an examination rigorously based on the actual driving conditions of today.

Officials declare, "Driving is a privilege" yet we license and "control" it with indulgence.



The New Highways: Mere Beautiful Design or Functional?

H. G. ECKHARDT

Mr. Eckhardt is Chief Engineer of Traffic of the Ohio Department of Highways. He joined the Department in 1934, became Assistant Traffic Engineer in 1945 and was appointed Chief Engineer in 1954. Mr. Eckhardt was formerly Assistant Planning Engineer of Akron, Ohio, from 1926 to 1931; he also served three terms on the City Traffic Commission of Columbus, Ohio. A Registered Professional Engineer in Ohio, Mr. Eckhardt is a member of the Institute of Traffic Engineers and president of the Ohio section of ITE. He is also a member of committees of the Highway Research Board, American Road Builders Association, and the American Association of State Highway Officials.

A DINNER can be an epicurean delight abounding in exotic dishes or it can be just a nourishing succession of satisfying foods. Similarly, a highway can become a monument to the near-perfect product of a razor-keen designer's theory, or it can be a truly functional means of transporting persons and goods safely and swiftly. Could it be that the nation is about to experience the counterpart of the nameless architect who accomplished the ultimate beauty of a palatial residence, but forgot to include a kitchen and bath?

Foolish, indeed, is the individual who today would seriously question the manifestly wise principles embodied in modern concepts of sound geometric design. Ample evidence is readily available to convince even the most voluble skeptic that highways built without the security of such modern techniques as limitation of access must eventually fail to achieve their primary purpose.

Notwithstanding that viewpoint, *a new threat has appeared.* It has suddenly dawned upon the highway builder that he has been so busy with the complexities of his profession he has almost forgotten one important factor – the ultimate user. True, his designs envision most of the user's habits, instincts, and desires; grades are easy, curves are flat, and he has made possible long, effortless trips by automobile or truck. But in spite of all these obvious benefits, the

true perspective of service to the user has unintentionally become distorted.

The day has arrived when the uninterrupted, long distance trip by railroad or plane can be challenged by the highway. Amazing distances can now be traversed without grade crossings, traffic signals, and intersection inefficiencies to say nothing of countless interferences and frictions that beset the driver heretofore.

Dr. Miller McClintock, who listed the four basic frictions that beget both accidents and congestion, was quick to recognize marginal friction as one of the enemies of fluid traffic flow. It should be obvious that the less the intensity of ribbon development, the less will be the exposure to accidents. Two of every three fatalities on conventional roads are eliminated on controlled-access highways, according to nation-wide statistics. Direct access, therefore, must be held to the irreducible minimum on the high-volume, high-velocity highways being built today.

Advantages of Access Control

Built-in capacities can be preserved by omitting the cumulative and retarding effects growing out of direct access to roadside residences and establishments; such capacity, built into a highway facility at considerable cost, should not be diminished by permitting promiscuous direct access.

The engineer is gratified to know that, by limiting access, his efforts to produce an economically sound transportation system will not have been wasted by the onset of untimely obsolescence. It should be equally pleasing to the investor in private business to realize that stabilizing of land values has made his investment sounder for the same reason.

For example, since the completion of the northerly portion of Route 128 in Massachusetts, more than $150 million worth of industrial construction occupies land that was once only fields and woods not readily accessible before. This is no doubt because industry and employees can operate in these areas without being hampered by the innumerable exits and entries so prevalent along conventional highways.

These are not mere theoretical advantages. Examples of what has actually occurred because of a lack of control are plentiful. Route 26 in California (or about thirty miles of it), for instance, was converted from a modern arterial to an ordinary, overloaded highway in four short years entirely as the result of a continuous ribbon of roadside development.

But without detracting from the obvious benefits of the controlled-access principle, it should be kept in mind that it is, after all, a principle or an abstraction. People who use highways are not abstract and it is for people that highways are built – people who have certain needs and requirements apart from the desire for swift and safe transportation.

The 41,000-Mile "Closed System"

The Interstate and Defense Highway network of some 41,000 miles, authorized by the Federal Aid Highway Act of 1956, is now under way; a project twenty-nine times greater than the combined cost of the Panama Canal, the St. Lawrence Seaway and the Grand Coulee Dam. From coast to coast it will traverse both urban and rural areas, providing a sort of a "closed system" in which promiscuous entry and exit are precluded.

The states, in undertaking this gigantic task, are finding that their highway administrators must give careful consideration to planning for necessities hitherto viewed as outside the pale of their normal field. Theirs will be the responsibility of operating their product much as a railroad, an airline, or a steamship line looks after the welfare, comfort, and convenience of its passengers, and without the threat or eventual ribbon development that invariably results in the absence of access control.

In not a few states a diverse array of activities are performed as "operations" often by wholly unrelated and non-correlated organizations. Some of these are:

1. Policing
   a. Accident investigation, reporting and prevention
   b. Aid to distressed drivers
   c. Enforcement of traffic rules

2. Traffic Control
   a. Signs and marking
   b. Analysis of accident statistics
   c. Development of preventive safety measures
3. Services
   a. Fire, ambulance, medical emergencies
   b. Minor tire and motor repair
   c. Fuel and accessories
   d. Rest and comfort provisions
4. Communications
   a. Radio
   b. Roadside public television
   c. Television scanning
5. Maintenance
   a. Weed control
   b. Ice and snow removal
   c. Patching and painting

In discharging many of these activities, the state will, in effect, espouse the appropriate perspective of considering each motorist a "customer" whose needs, safety, and welfare must be served. And a customer he is, for he provides much of the funds to finance the huge improvement program. It is *his time* that is saved and *his losses* in brake, fuel, and tire economy that are involved.

If the Interstate Highway System is to provide the attraction and service it is supposed to, it will be supporting the equivalent of cities on wheels and in motion. Furthermore, its customers will demand at least the minimum services of a modern city.

Providing Minimum Services

What are minimum services: Webster defines minimum as "the least amount assignable". So it appears the least amount of services would be such items as water, fuel, rest facilities, food, and minor repairs. In addition, first aid, fire fighting, and roadside telephone service may be found highly desirable services.

At the last meeting of the American Association of State Highway Officials, Mr. Charles M. Noble, then Chief Engineer of the New Jersey Turnpike Authority, said:

"A cardinal principle has emerged. The public is loath to leave, in fact will not leave, a major highway in search of such facilities unless assured that acceptable services can be reached along a well-maintained and marked route. Consequently, it becomes necessary to integrate these services into the overall highway plan so the motorist may be offered complete service for his comfort, safety and convenience. Searching for service in strange territory, particularly at night with the probability of getting lost, is distasteful to the public and not acceptable."

The difference between essential and non-essential services should be made quite clear. Ice cream stands, souvenir shops, bowling alleys, and the like are admittedly not within the reasonable connotation of services that are essential. On the other hand, fuel or repair is definitely demanded if a limited-access highway facility is to be used. The vehicle halted for lack of either one actually is transformed into a serious hazard merely by being halted even though the stop is made just off the paved surface.

That users of limited access facilities do patronize well-placed service units can be illustrated by looking at the record. On one well-known turnpike, 11,000,000 meals were served and 18,000,000 gallons of gasoline sold in one year at ten outlets. In another case (not a toll road) where service facilities were not originally provided, the demand grew so insistent that a service station was installed as an experiment. The operator was swamped with business and was soon forced to limit his "trouble runs" to a short distance from his place of business. Other similar units are now in full use on that highway and doing very well.

There can be no escaping the fact that a distinct difference exists between the type of and necessity for services required in the wide-open spaces with infrequent interchanges, and those in comparatively closely spaced ones. The highway administrator must possess a high degree of perception to recognize those facilities that are wholly in the public interest and to discard those that are selfish, money-making endeavors.

Without doubt, the first thought of objection to a proposal of this kind would hinge upon the threat of over-development. This fear should be easily dispelled by considering the two most potent counteractions. One is normal competition in allowable businesses. The other is topography.

No two experienced food purveyors, for example, would invite

business failure by deliberately locating so near each other that neither could prosper. Even should they be so tempted, firm restraint imposed by a well-informed and impartial administrator aided by demand, should itself counteract that tendency.

And what highway engineer is not painfully aware of natural restrictions caused by topography? Deep cuts, high fills, rivers, rock out-cropping, and other similar situations can alone have a direct bearing on the practical placement of needed service areas.

Limited Access and Customer Service

If it is agreed that admittedly fundamental and beneficial results must accrue from the use of the limited access principle, and similarly that the customer (who pays the bill) must be given every possible consideration for his comfort, convenience, safety, and welfare, how then can the two ideas be successfully brought together?

First, certain rules should be followed implicitly. There can be no avoidance or side-stepping of them. Most important are these:

1. Service areas *must* be off the highway right of way.
2. They *must* be arranged to that ingress and egress thereto rigidly adheres to established rules of geometric design.
3. Safety, accessibility and usefulness are inescapable.
4. Financing should be on a simple "cost recovery" basis.
5. Avoid unnecessary architectural flamboyancy and emphasize simple, effective, and business-like appearance.

These rules bring into focus the implementation of integrating two elements into a working plan. Details of design of such services areas will remain for the designing engineer in providing for reasonable, safe, and convenient ingress and egress; but it cannot be too strongly emphasized that both entrance and exit provisions *must* conform to well-known geometric principles.

Adequate deceleration lanes, properly illuminated, would lead into a plaza of dimensions that will accommodate the movements of a motorist seeking essential services. Likewise, upon leaving the area, the customer would be funneled into an appropriately devised acceleration lane equipped with so-called "adaptation" lighting so drivers would not be plunged summarily into inky darkness.

The plaza itself would be insulated from the through-traffic

lanes by a well-planted, wide, medial strip, curbed and possibly fenced to discourage pedestrian usage. Dimensions or area to be used for service-area plazas are presently undetermined. A minimum of five acres up to twenty acres (depending upon local conditions) might serve, modified by needs and by topography.

Of prime concern is the method of providing for such areas. Since they must be off the highway right-of-way in order to preserve and protect limitation of access, it appears entirely reasonable that extra or excess land area could be acquired. That portion not required for normal highway purposes could then be subdivided into not more than four appropriate parcels. Such parcels would be subject to re-sale on competitive bid and strictly upon a cost-recovery basis with rigid avoidance of any revenue-raising idea and with restrictions running with the land.

Equally important is the matter of spacing. Publicly provided fixed-plant areas for the purpose of privately supplying food and fuel (including minor tire and engine repair) would conceivably call for varying intervals but in no case less than fifteen to twenty-five miles. Any policy aimed at determining spacing should be sufficiently flexible to permit tailoring the location of service areas to meet local conditions snce the latter can differ perceptibly on different highways.

It would appear reasonable to asume that food-dispensing facilities might well be reckoned in terms of normal travel time of forty-five to fifty minutes (or about forty to sixty miles). Fuel areas, on the other hand, might be considered too frequent if spaced less than twenty to thirty miles apart.

In any event, spacing design should be determined wholly upon the premise of essential, convenient service tempered by topographic and environmental conditions. Under no situation should facilities of the type herein discussed be permitted nearer than ten miles to any urban extension of an interstate or other similar highway.

Safety and Service for New Highways

In this discussion, the author hoped to impress the reader indelibly with two strong convictions:

The first is the unequivocal acceptance of the principles involved

in limitation of access. Even the casual student of highway history can recognize the hopelessness of designing, constructing, and operating a modern highway for modern traffic only to witness its untimely obsolescence due to the inevitable choking effect of roadside development. The doctrine of free enterprise will not be abridged. And countless examples bear evidence that as goes automotive transportation, so go competitive business and housing development. It is therefore essential that, to protect the gigantic investment of public money in providing for the fluid flow of persons and goods, the highways built thereby must be kept free from the deleterious effects of marginal development. Such conclusion is inescapable.

The second conviction is that highways for interstate travel are built for but one purpose – to support moving traffic; and traffic requires both vehicles and operators. Both demand motive power and maintenance – fuel, food, and rest.

To use modern highways, the driver is obliged to seek places to refuel his vehicle, repair and maintain it, and also places where he may restore his own energy by rest and by the consumption of food. These are essentials and *will be sought out* regardless of where they may be obtained. If the driver is obliged to leave the highway to find them he will, even though the detour may be distasteful and not in accord with the idea of uninterrupted travel.

It cannot be denied that were such services available at convenient, safe "side tracks" and his essential needs could be supplied with minimum disturbance to his progress toward an ultimate destination, he would be well served. He would like that; as much as he appreciates adequate superelevation of long, easy curves, flat gradients, and comfortable, safe lane-widths.

This, then, is just another service that the highway administrator should recognize as one the traveling public may come to expect, even demand, as part and parcel of its use of an up to date, well-conceived highway system.

These two convictions are not incompatible. There is no good reason why they cannot be integrated if careful thought and planning be exercised as a highway undergoes preliminary design before construction. It remains for the planner, the designer, and the op-

erator of a highway system to arrive at mutually acceptable ground rules whereby desirable results can be realized.

The idea bears repeating that in accomplishing this desired end, there can be no abridgment of the proved policies of sound geometric design nor should any thought be given to providing service areas with a view to producing revenue.

Finally, it is believed that building highways for safe, economical transportation of person and goods cannot end with the mere provision of structurally sound, well-aligned, easily-traveled roadways. Highways must be maintained, operated, policed and regulated for the benefit of the user. It is a short but important step from the procedures accepted normally in highway administration to that of supplying the one element of good transportation – safe convenient, economical service and comfort to the customer who, after all, is the one who pays the bill.

Subdividing for Traffic Safety

HAROLD MARKS

Mr. Marks has been since 1948 Traffic Survey Engineer of the Los Angeles County Road Department, directing all traffic planning and research. He was formerly freeway design engineer for a New York consulting and engineering firm. Mr. Marks is a Registered Professional Engineer in California and New York, and an associate member of the Institute of Traffic Engineers.

ARE we subdividing for traffic safety? To the planner and engineer our new street patterns for residential subdivisions may obviously appear safer than the old. But other organizations who have a legitimate interest in new design policies may not be easily convinced. The fireman, the policeman, the delivery man—in fact, all who must service these subdivisions have been inconvenienced by the discarding of gridiron street patterns that formerly predominated.

One of the principal objectives of modern design is increased traffic safety. The new patterns were evolved on the basis of extensive experience and judgment. However, many public agencies have been handicapped in past years with inadequate statistics to substantiate these new policies.

In Los Angeles County, this need for basic facts resulted in extensive accident-research studies of new and old subdivision design practices. Not only were we interested in determining whether new designs were safer, but how much safer. If this could be done, the next step was to find out which design features were responsible for this additional safety.

Now, with the completion of some of these studies, it is possible to substantiate opinions with statistics and facts to prove that the advantages of new designs outweigh the obvious disadvantages. Summarized here are the principal findings to date concerning the relative safety of various types of subdivisions and their design features.

This subdivision design research represents one phase of an overall program for improving the safety and efficiency of the Los

Angeles County street system. The program is under the sponsorship of the County Board of Supervisors and executed by the road department under the direction of the Road Commissioner.

Scope of Study

The study included eighty-six residential subdivision tracts with a total developed area of 4,320 acres, representing a population of 53,000 persons. It embraced 108 miles of residential streets including 660 intersections.

Subdivision design can be separated into two general types—gridiron and limited access. In recent years limited access has been accepted in most areas as reflecting modern design trends. A basic comparison was therefore made between the performance characteristics of these two types of design. Total areas and population characteristics of the gridiron and limited-access subdivisions studied were approximately the same so a valid comparison could be made. Each of the tracts is protected with the normal types of intersection traffic control, placed according to nationally accepted practices.

The study period included a five-year accident history for each tract. Since right angle collisions represent approximately 84 percent of all vehicular intersection accidents within subdivisions, this initial study has been limited to right angle collisions at intersections of local streets.

Gridiron Subdivisions

Figures 1 and 2 illustrate the accident pattern for a group of gridiron subdivisions. Each x represents one vehicular accident during the five-year study period. The heavier lines are major streets bordering the subdivisions which were not included in this phase of the accident analysis.

The distribution of accidents in most of the tracts is fairly uniform throughout. In fact, an accident pattern appears to develop wherever two continuous streets meet at an intersection. Figure 1 includes urban subdivisions where the normal grid patterns are interrupted only by schools and parks. These create some three-

legged T-type intersections and a few non-continuous streets. It will be noted that the T-type intersections generally have no accident history.

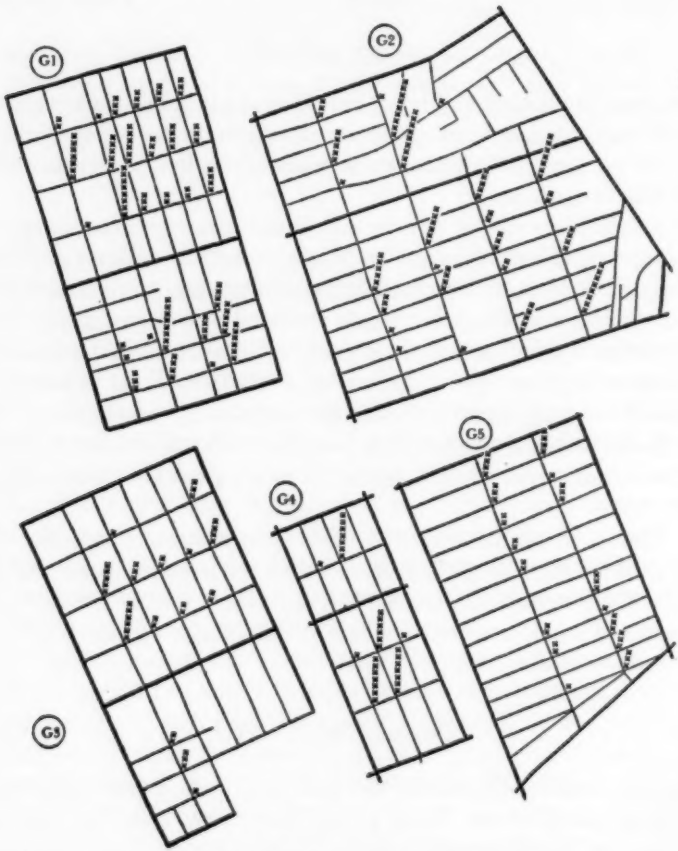


Figure 1. Subdivision Design: Gridiron

Figure 2 includes some gridiron subdivisions in less urbanized areas. The general distribution of accidents continues but with lesser intensity. Also some tracts are generally gridiron in pattern but assume the characteristics of limited access in some sections. They develop discontinuity at railroads, rivers and other obstruc-

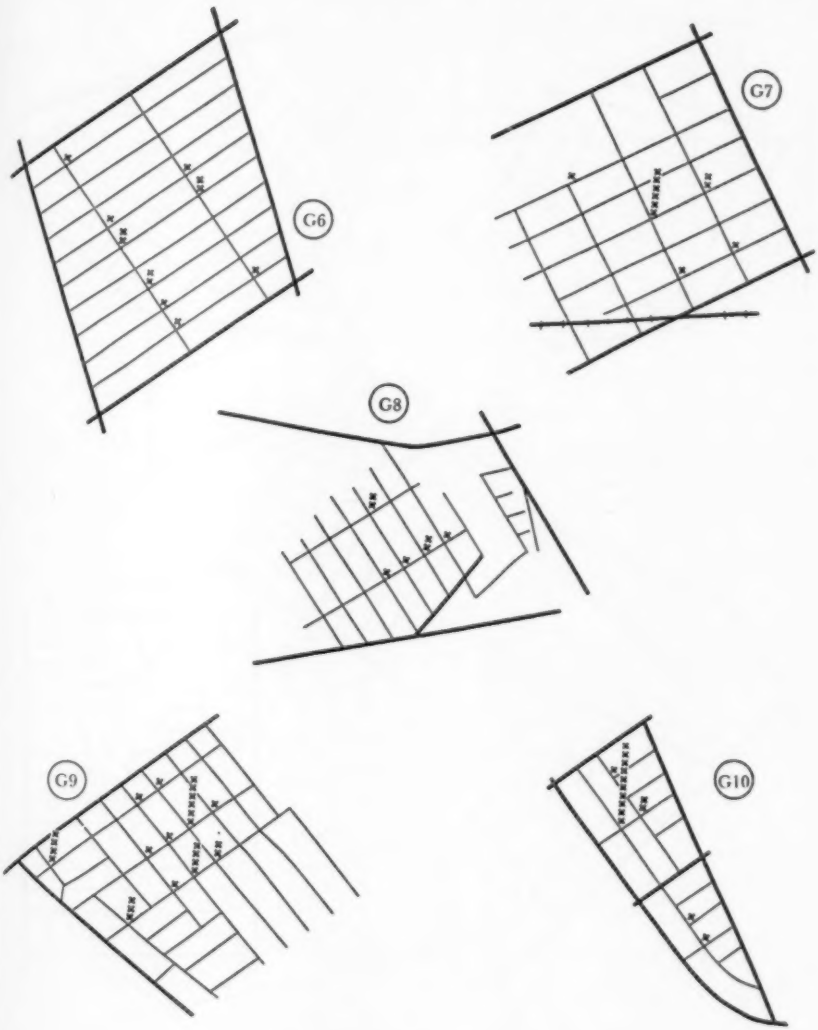


Figure 2. Subdivision Design: Gridiron

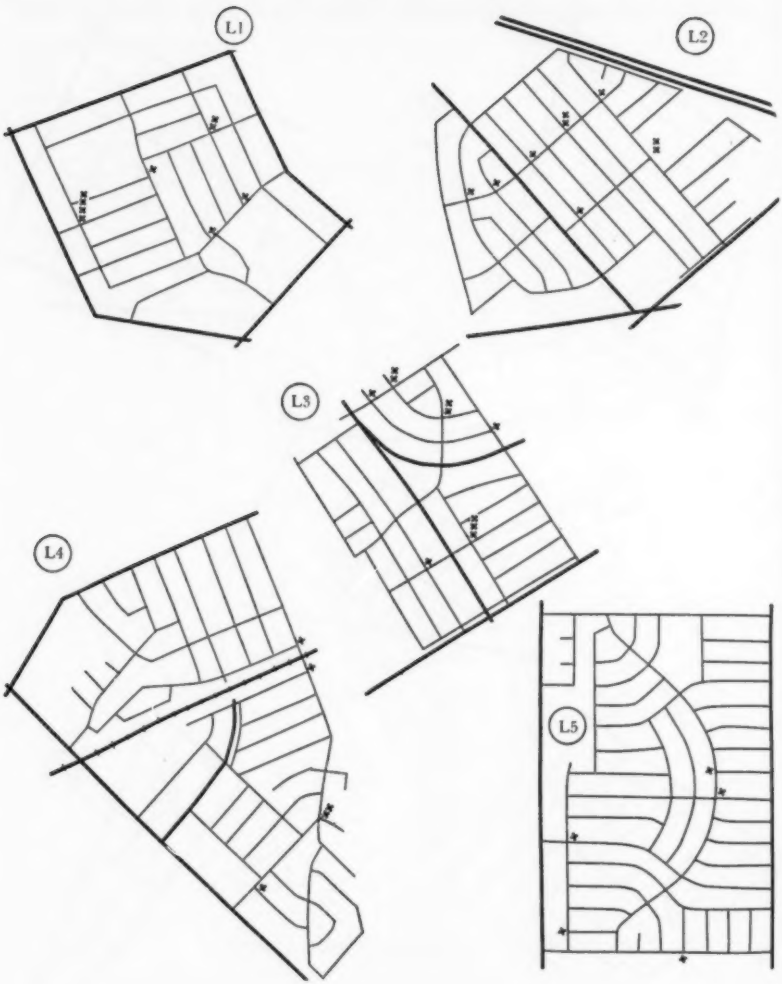


Figure 3. Subdivision Design: Limited Access

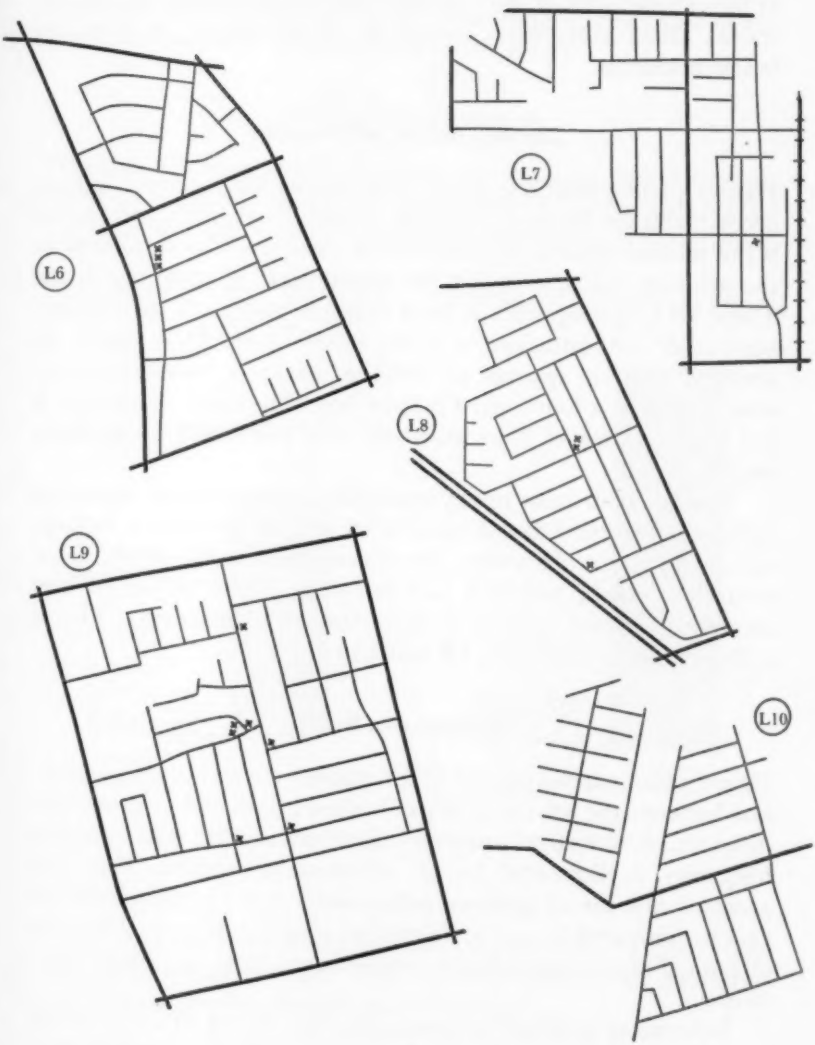


Figure 4. Subdivision Design: Limited Access

tions. In these subdivisions, accidents tend to become concentrated at the intersections of the principal continuous streets serving the tracts. Those areas most limited in access appear to have the fewest accidents.

Limited Access Subdivisions

Figures 3 and 4 illustrate the accident history for a series of limited access tracts for the same five-year period. Particularly interesting is the relative number of accidents in these tracts as compared to the gridiron tracts, and also the distribution of these accidents. There no longer appears to be a uniform pattern of distribution but rather concentrations at a few intersections. Here again, an accident pattern appears to develop wherever two continuous streets meet at a four-legged intersection. Especially significant is the large number of T intersections with practically no accident record.

Tracts which most nearly resemble a grid pattern, including numerous intersections of continuous streets, develop a definite accident pattern. However, the tracts isolated by rivers, flood control channels, railroads and freeways, where access is most severely restricted, appear to have the fewest accidents. This is is illustrated by tracts L7, L8 and L10.

Comparative Safety

Figure 5 summarizes general observations with an overall comparison between the relative safety of limited access and gridiron subdivisions. A statistical summary of accident rate and accident frequency is illustrated for all subdivisions studied. The total accident rate for all gridiron subdivisions was 77.7 accidents per year as compared to 10.2 accidents per year for an equivalent area of limited-access subdivisions—an accident ratio of almost eight to one.

In terms of accident frequency 50.0 percent of all intersections in gridiron subdivisions had at least one accident during the five-year period. In contrast, only 8.8 percent of the intersections in the limited-access subdivisions experienced accidents during this

period—a frequency ratio of almost six to one. This is particularly significant since there were 65 percent more intersections in the limited-access tracts than in the gridiron tracts.

Distinguishing Features

With such a tremendous variation in the internal accident experience between these two types of subdivision design, it is appropriate to analyze the basic differences that distinguish one from the other.

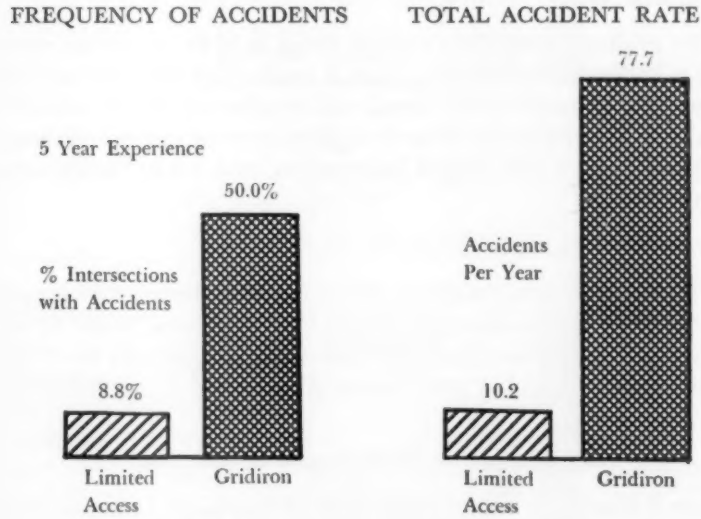


Figure 5. Subdivision Design: Gridiron *vs.* Limited Access

1. *Limited Access.*

The frequency of access connections to the major highway has been reduced considerably. This has been achieved by providing service roads, backup design, culs-de-sac, etc.

2. *Discontinuity of Streets.*

In gridiron subdivisions all local streets extend continuously from one major street to another. Limited-access subdivisions seek

to eliminate continuity between major streets in order to discourage through-traffic movement.

3. *Street Pattern.*

The gridiron subdivision is characterized by the straight grid street pattern. Limited-access designs have developed such features as curved street alignments, cul-de-sac blocks with turn-around loops, relatively short street runs of one or two block lengths, 90-degree elbow turns, and other distinguishing features.

4. *Collector Streets.*

In gridiron subdivisions every street is both an access street and a collector street exiting into a major highway. In limited-access subdivisions certain streets act as collectors for the subdivision. Local-access streets enter the collector street either at a three-legged T or at a four-legged intersection, and are generally non-continuous.

5. *Intersection Characteristics.*

The grid pattern results in virtually all 90-degree four-legged intersections. Limited-access designs usually have more intersections but with fewer legs. The new designs have very few four-legged intersections but many more three-legged T intersections.

Three-legged and Four-legged Intersections

Figure 6 illustrates the accident rates of four-legged intersections as compared with three-legged intersections. Only uncontrolled intersections, those without STOP signs, were included in this comparison in order to isolate the effectiveness of the basic design feature, unaffected by traffic control devices.

The accident rate at three-legged T intersections was the same for both types of design, averaging .006 accidents per intersection per year. Thus, for every thousand T intersections, only six experienced even a single accident during a one-year period. In contrast, the accident rates for four-legged intersections were .246 and .085 for the two design types. Gridiron subdivisions had an accident experience three times as great as limited-access sub-

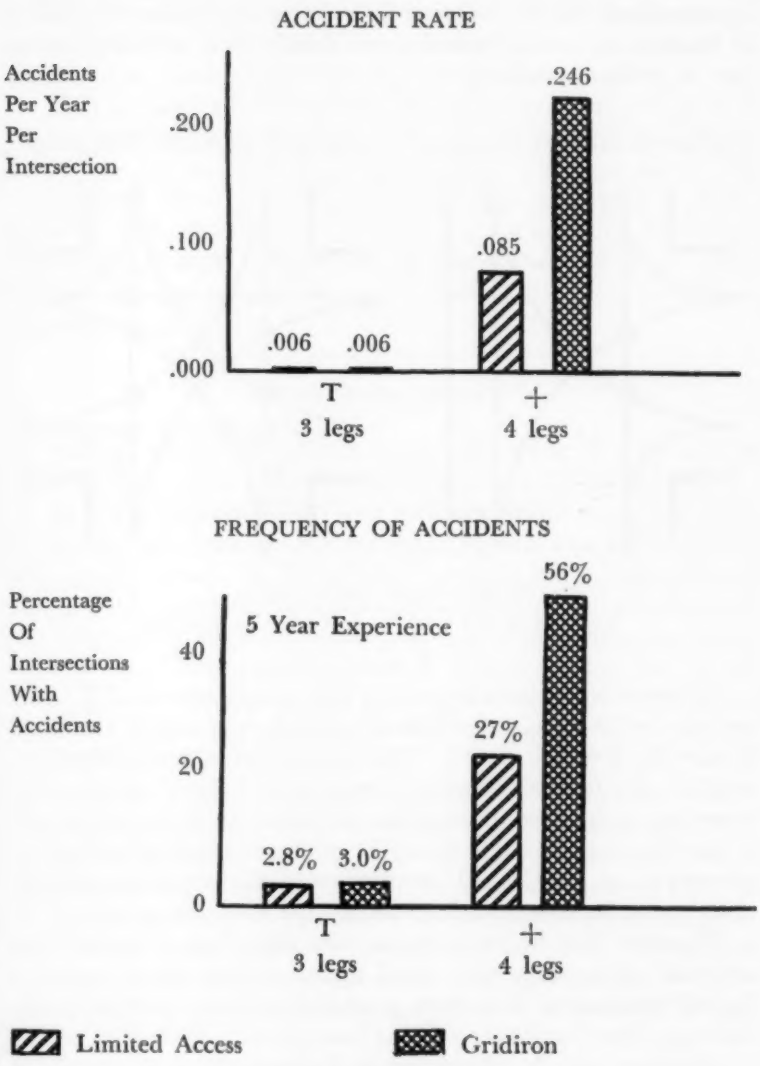


Figure 6. Subdivision Design:
Comparison of 3-legged and 4-legged intersections

divisions for the four-legged intersection. Comparing four-legged intersections with three-legged intersections, the ratio of accidents is fourteen to one in limited-access subdivisions and forty-one to one in gridiron subdivisions.

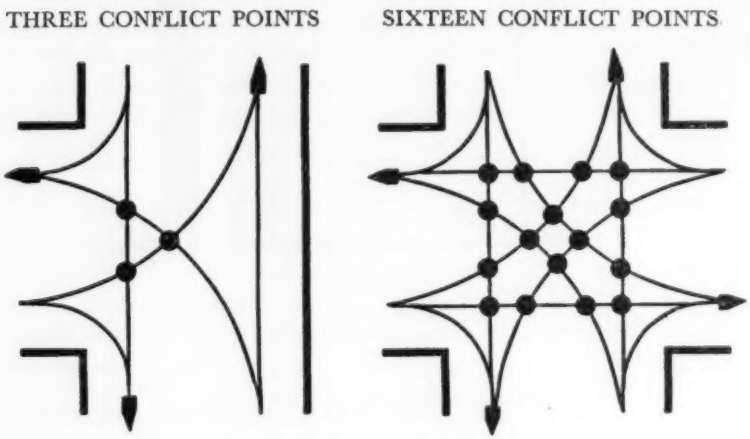


Figure 7. Traffic Conflict Points:
Comparison of 3-legged and 4-legged intersections

In terms of accident frequency, only 2.8 percent of all T intersections in limited-access subdivisions had even a single accident during the five-year period. This is comparable to the frequency in gridiron subdivisions where 3.0 percent of the T intersections experienced accidents during this period. In contrast, 56 percent of the four-legged intersections in gridiron subdivisions and 27 percent of the four-legged intersections in limited-access subdivisions had at least one accident during the five-year period.

Figure 7 illustrates one reason why three-legged intersections are safer. Comparing theoretical traffic conflict points, a three-legged intersection has three potential crossing conflict points whereas a four-legged intersection has sixteen such conflict points.

Another built-in advantage of T intersections is automatic assignment of right-of-way. Vehicles entering the intersection from the discontinuous leg must slow down to turn left or right; they

normally expect to yield to traffic on the continuous street which is thus automatically assigned right-of-way. This eliminates the usual indecision as to which vehicle has right-of-way, which is typical of an uncontrolled four-legged intersection.

This detailed analysis of the relative safety of three-legged T intersections as compared to four-legged intersections should not be interpreted to mean that four-legged intersections cannot be used safely. Many four-legged intersections have proved to be relatively safe, as illustrated in tracts L4, L5 and L10. However, it will be seen in these tracts that usually at least two of the intersecting legs are non-continuous, extending for only one block beyond the intersection.

Other Design Features

Studies of less detailed nature have been made of other design features from which some general conclusions can be developed.

In some tracts, relatively long collector streets serve short culs-de-sac and other non-continuous access streets. This design is used effectively in tracts L5, L7, L8 and L10 and a low accident history is indicated. However, collector streets which extend continuously from one major street to another and cross other continuous streets tend to develop an accident pattern, illustrated in tracts L2, L6 and L9. Collector streets offer a satisfactory degree of safety when they exit into only one major street and have no cross conflicts with other continuous streets.

Some design features appear to be particularly accident prone. These include multi-legged intersections of more than four legs; irregular, Y-type intersections where the intersecting legs meet at acute angles; jogs in alignment where the legs are too close together to operate properly as separate T intersections; adjoining intersections too close together to operate independently; intersections adjacent to bridges, railroads and other obstructions to clear visibility; and similar features that should be avoided for safe design.

Most of our subdivision accident studies to date concentrated upon internal accident characteristics within the subdivision. Supplementary studies are now under way to determine the accident

characteristics where local streets enter major highways. Some preliminary trends have been uncovered which are worthy of consideration.

Limiting of Access

Frequency of access onto major highways appears to be a most important element. Optimum traffic signal spacing along a major highway is normally at least a quarter-mile to achieve progressive traffic movement and speed control. It would therefore be desirable to space access points at quarter-mile intervals and thus serve several purposes. Concentration of all subdivision access at the quarter-mile point would generate sufficient traffic at the entering street to meet minimum traffic signal volume warrants. If traffic is permitted to leave the subdivision at several points, no one point would have sufficient volume to warrant a signal installation. Also, by concentrating all traffic control attention at one point, all traffic entering and leaving the subdivision is given maximum protection.

This built-in traffic safety program should include pedestrians as well as vehicles. If pedestrians are permitted to cross the major street promiscuously wherever they choose, one of the principal advantages of limited access is lost. Pedestrians should also be required to enter and leave the subdivision at these traffic-controlled intersections. This provision is generally achieved by backup, side-on or cul-de-sac design, with a fence or wall provided along the backs of the lots.

Although the requirement may appear somewhat severe, an analysis recently completed indicates that 78 percent of all pedestrian accidents involving school age children occur midblock and are generally attributable to carelessness. It is desirable to provide restrictions upon pedestrian movement as well as vehicular movement to protect persons from their own carelessness.

Wherever it is possible to locate the principal access points at good signal timing locations, the access streets on both sides of the major highway should fall opposite each other for most efficient signalization control. This does not apply to intermediate access streets where there would be little likelihood of future signaliza-

tion. At such intermediate locations T intersections would normally be preferable to four-legged intersections.

Built-in Traffic Safety

Accident research activities indicate that it is possible to build traffic safety into a subdivision by proper design. An impression prevails that safety can be added later, after the subdivision is built, by using traffic signs, signals and markings. These tools of the traffic engineer cannot correct basic design deficiencies; they can only attempt to minimize effects of faulty design and reduce the number of accidents. A STOP sign is essentially a device used to correct an inherent design weakness. This point is illustrated by many of our limited access subdivisions which do not have a single STOP sign and have very few accidents.

Unlike the planner and the subdivision engineer who are finished with a tract after it is occupied, the traffic engineer's headaches begin after people move in. Any problems developing from design inadequacies come home to roost with the traffic engineer who is the man on the firing line when poor planning results in accidents. He should, for self-defense, take an active interest in subdivision planning to reduce the number of problems he will have to face in the future.

From the wealth of background and experience accumulated in dealing with problems in existing subdivisions, the traffic engineer can frequently anticipate which design features will create similar problems in the future and can thus advise the planner. In any long range traffic safety program, it is considerably more valuable to correct deficiencies in the design stage before they develop, than to place restrictive traffic control devices later.

Elements of Safe Design

Sound planning, based upon knowledge of good design practices, can eliminate built-in traffic hazards we now live with. With the statistics now available, it is possible to develop some conclusions regarding safe design.

1. Limited access design, preferably limited to quarter-mile access points, appears to provide maximum safety.

2. Backup, side-on or cul-de-sac treatment is generally preferable to a service road contiguous to major highways.

3. Continuous through-streets extending from one major street to another should be avoided.

4. Collector streets are satisfactory when there are no continuous cross streets and if they exit into only one major street.

5. Four-legged intersections should be used infrequently, although they are not objectionable where non-continuous access streets join the collector street.

6. T-type intersections should be used more frequently.

7. Such design features as multi-legged intersections with more than four legs, acute angle and Y-type intersections, and jog intersections should be avoided.

Improvement of Existing Subdivisions

The discussion thus far has concerned new subdivision design. Must we assume nothing can be done to improve present subdivisions? It would be interesting to take one of our typical gridiron subdivisions, Figure 8–G4, to determine what could be done from a design standpoint to correct the present accident problem. This small tract presently averages six accidents a year. Theoretically, the rate could be reduced to less than one accident a year if the street pattern could be transformed into a limited-access design.

One of the basic requirements is relatively simple—that all streets be made discontinuous. It could be redesigned as indicated in Figure 8 by vacating some streets and creating some culs-de-sac and elbows as shown. Theoretically at least, it is possible to transform a gridiron subdivision into a limited-access type by applying new design principles. From an economic standpoint the cost of the improvement would be relatively small and would be more than compensated by the reduction of traffic accidents.

Of course, the key point is the feasibility of such a proposal. It may appear perfectly sound from a theoretical standpoint, but is it practical? One can always find a hundred people who can prove that nothing can be done about anything – particularly any-

thing as radical as changing an existing street pattern. The only trouble with this objection is that street patterns have been changed in some areas – and very successfully.

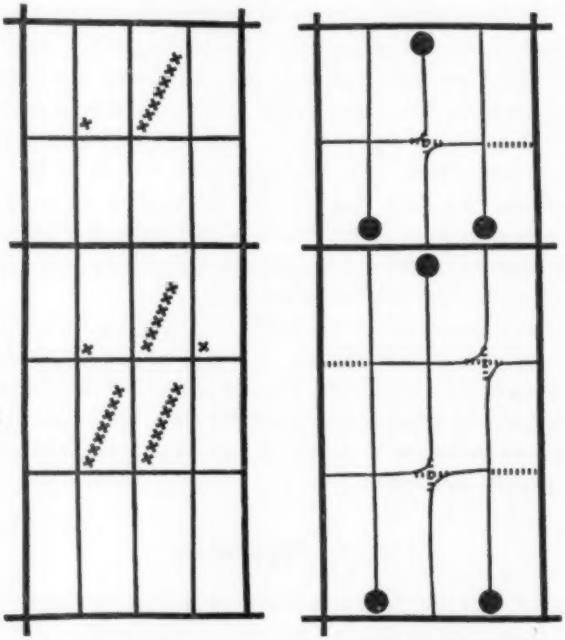


Figure 8. Gridiron Subdivision Redesigned

A notable example, reported last year in a national magazine, involved a formerly quiet residential neighborhood rapidly deteriorating from through-traffic and the accompanying noise and accidents. Local gridiron streets attracted about 2000 vehicles a day that by-passed the bordering main streets. Home owners wondered why they couldn't have the same protection from through-traffic as new subdivisions have.

After considerable study they found out that they could. A community improvement association, in conjunction with the technical services provided by their governmental agencies, devel-

oped a program of street improvements whereby all continuous street-runs were broken by traffic diverters, turn-arounds, and culs-de-sac. The relatively minor cost was more than re-paid by rising home values and fewer accidents. Now the local streets have reverted to their former purpose of serving the residents safely and efficiently.

What has been accomplished successfully in one area can be applied elsewhere. Increased traffic safety would be a prime objective of this type of improvement but it would also have many desirable by-products. It is basically a new concept in urban redevelopment. Not only does it offer a method of protecting an older subdivision from traffic hazards and noise, but also from the resulting neighborhood blight, property depreciation, and loss of residential character and attractiveness.

It is not a panacea for all older subdivisions but it has merit worthy of serious consideration. As with any basic change there are many practical problems. One is inertia. Public acceptance, even engineering acceptance, may be hard to obtain; but it is offered as one solution to many of our local traffic dilemmas – a solution proved successful.

Future Applications

Even considering the limited number of studies completed to date, I believe it is possible to say with some degree of confidence that we are subdividing for traffic safety. We can show how much safer certain design features are compared with others. This data can be used to support our design policies. Our new subdivisions have built-in traffic safety. Perhaps of even greater significance for the future, the same principles that provide greater safety in new subdivisions can be applied to older subdivisions whenever we are ready to accept this new concept. Since most traffic accidents on local streets occur in older gridiron subdivisions, that is where the greatest improvement of traffic safety can be achieved in the future.

Much remains to be done in this field before we have all of the answers. This one of several studies under way illustrates the new factual approach to street design – an approach based upon accident

experience. The principal symptom of poor design is the history of excessive traffic accidents.

Undesirable design elements will normally be reflected in the relative performance of a street as a safe traffic-carrier. Thus, a wider application of accident statistics for engineering analysis can provide a sound foundation for an overall program of accident reduction.

The Role of the County In the National Highway Program

HOWARD BUSSARD

Mr. Bussard is county engineer of the Automotive Safety Foundation. Widely experienced in state-county highway activities, he was for twenty years county engineer of Lyon County, Minnesota. As secretary and president of the Minnesota County Highway Engineers Association, Mr. Bussard helped establish a county division within the state highway department to provide better working relationships between counties and the state. He also helped to establish an annual institute for County Engineers at the University of Minnesota. In recent years Mr. Bussard has handled county aspects of statewide highway studies conducted by the Foundation. At present he is working with county groups in Kentucky and Minnesota to establish methods of selecting and programming improvement projects, and with the executive committee of the National Association of County Engineers to develop a program for improved county highway management.

THE greatest public works program in history, the national highway system, will pose problems for all highway agencies and all political subdivisions. Generally speaking, the federal government and the states are well enough organized and equipped to carry forward their portions of the program. The same, unfortunately, cannot be said for our counties.

Three thousand counties have road-construction and maintenance responsibilities. The programs of all these counties will be profoundly affected by the Highway Act of 1956. Yet fewer than one-third of our counties are now organized and staffed to pursue efficiently the tasks they face in the immediate future.

The so-called grand plan for completion of the national system of interstate and defense highways has, understandably, captured public imagination. That the interstate system will importantly affect the counties it traverses, goes without saying. But often overlooked is the fact that the interstate network also will pose urgent problems for counties it does not penetrate.

The problems that confront county road agencies make apparent the immediate need for sound management plans and engineering principles applied to local road administration.

Counties everywhere will feel the effect of that provision of the 1956 Act which governs control of access on the 41,000-mile interstate system. This provision will bring marked changes in traffic volumes and traffic patterns not only in counties along the system but also in those several tiers of counties distant.

It is axiomatic that construction of high standard facilities stimulates travel. The interstate system will be no exception. As better roads put convenience, comfort, and even fun back into driving, more and more motorists will take to their cars – for trips of longer distances. This result, plus growing vehicle registration, points to greatly expanded travel mileage in the near future.

With limited entrances and exits, and with cross traffic eliminated by overpasses and underpasses, controlled access facilities will be able to carry large traffic volumes at relatively high speeds. Distances, measured in travel time, will be shortened considerably. Getting in and out of any county with greater ease is certain to generate traffic on all roads – including those on the various county systems. A real danger exists if counties do not take steps now to anticipate this change in local traffic volumes.

Demand for Better County Roads

Travel will spread beyond the main routes as motorists experience the ease and convenience of these newer roads. It will be only natural for drivers to wish for better road facilities in their own areas. This desire, added to road needs now existing in many areas, will generate a public clamor that something further be done. Counties face a big job in meeting such a demand.

Increased traffic volumes and changing traffic patterns pose new problems for county administrators. Where volumes justify, structures to carry cross traffic will be built over or under interstate system routes. Because of the expense of such structures, many roads may be cut off and travel re-routed to occasional planned crossings. In the future, then, people will travel routes other than their accustomed ones to reach their destinations.

In some cases, re-routing of traffic occasioned by the highway construction program will mean a change in destinations themselves. Changes in road facilities may cause some persons to choose a different town in which to market their products, make their purchases, or conduct other customary business. The routing of rural mail routes, for example, may be significantly affected.

Locating planned interchanges along the interstate system creates even greater problems. These interchanges afford choice locations for industry, business, homes, schools, and other institutions. Consequently, development of these areas not only will influence county roads; it can change the entire character of the vicinity. Locations now largely unimproved land could quickly become complete communities. In turn, these new communities could become destinations for considerable local or even long distance travel.

Long Range Planning Essential

Development of interchange locations, if properly controlled, will enhance growth that makes full use of the area. Such control must include plans to avoid future congestion by anticipating how roads and streets may be used in later years, and by preserving right-of-way for traffic movement. Interchange areas provide sites for development because of the free flow of travel on the main highway. This concept of free travel movement must also be maintained throughout the surrounding area or part of the benefit will be lost.

If past mistakes are to be avoided, guided development of these new communities through planning and zoning will be necessary. In many cases, the county can best perform these functions. Where this responsibility rests with the county, additional enabling legislation may be necessary. Counties that face future growth possibilities cannot begin too early to establish an overall planning authority.

But whether or not a county expects new community development, it can anticipate inevitable changes in its traffic by creating a centralized road agency with authority to establish and maintain proper cooperative relationships with the state highway department. The state highway department is the responsible planning agency, in charge of designing the new highways, including route locations

and placing of crossings and interchanges. Final choice of specific locations will definitely affect the road system of each county. But until the choice is made the county can scarcely evaluate the possible results.

Co-operation between the state highway department and counties, from early planning to final construction, is essential. Without this co-operation a sound solution to problem will be impossible. Local road agencies can be of much value to state planners by providing needed information. The county agency can help the public understand the reasons underlying certain state highway decisions as to design and location.

Once the location of crossings and interchanges has been established, county agencies can appraise potential effects on local road systems and plan for necessary changes. The planning division of the state highway department can be of real service to the county in surveying and reviewing changes in travel patterns resulting from the construction program, and by forecasting travel trends and evaluating their significance.

Reappraisal of the changed travel-pattern imprint on the county systems must coincide with planning for construction of the main road. The Congress stated a policy that main roads are to be built with the least possible disruption of travel; this is taken to mean total travel on all systems. With this statement in mind, county agencies should plan to improve adjacent roads simultaneously with the construction of the main road.

Improvements Depend on Traffic Needs

The importance of the local road to the major artery may largely dictate the degree of necessary improvement. What today are lightly traveled roads may transport heavy traffic volumes if they are selected to connect with the interstate system through an interchange, or carry traffic across the system on a special structure. In those cases, concentration of traffic will require a higher type of road. Changes in facilities should be completed as early as possible to enable travelers to reach destinations with minimum difficulty.

On the other hand, construction of new main roads may relieve

the load on parts of the county system. Traffic may be largely syphoned off to the new facility for the major portion of travel distance.

These new challenges point up the need for a county organization capable of coping with them. Years ago, when federal aid was inaugurated in response to a national demand for better roads, the Congress required states to develop a management plan before they could receive federal aid. To participate in the program, states had to establish highway departments staffed with engineers. This provision was enacted because specialized skills and good management practices were equally as important as funds in developing a sound highway program.

Experience has demonstrated the wisdom of this requirement. Existence of a central road agency within each state made it possible to conduct the inter-governmental relations required in administering the Federal-aid program, and to formulate and apply consistently higher standards.

Despite the demonstrated advantages of centralized management and applied engineering principles in county road development, counties have been slow to accept this idea and put it into practice. Only one-third of the counties require employment of qualified engineers as part of their management plan. Other counties rely upon experienced road superintendents to carry out what are basically engineering functions that demand training on a professional level. A great many counties cling to the old custom of elected road officials. Unfortunately, many such officials lack specialized technical training; often they direct operations concerned only with small districts.

Generally speaking, the level of county performance corresponds closely to the degree with which responsibilities calling for specialized knowledge and skills are assigned to properly qualified personnel. Best results are seen where the management plan includes employment of trained engineers; the poorest, where elected officials lack specialized training to direct road activities.

If counties are to assume their full importance in the highway modernization program, past experience can provide a sound guide for the future.

With wide variations in size, population, and resources of our 3,000 counties, no single blueprint for management will meet the needs of all. Problems and needs of a densely populated urban county will differ materially from those of a sparsely settled rural county.

However great the disparity in the nature of traffic problems among various counties, there is one common to all: need to provide a management pattern that will make the highway dollar yield full value in service to the highway user and to the public at large.

Although some of the problems that confront individual counties may not become apparent for several years, delay in providing for their prompt solution when they do arise could be serious. In many states, reorganizing county road administration along sounder lines will require enactment of legislation or, possibly, constitutional amendments. These procedures are time-consuming and have been known to drag on for years.

By starting now, counties can properly integrate their local systems with primary and interstate routes to insure that our current highway program will yield the benefits of a co-ordinated network. The dividend the public will derive from the new highway program in nation-wide transportation service can be materially reduced if the counties fail to face squarely their part of the total job.

The issue is clear. Will the counties act – and in time?

Traffic Police in the Small City

RICHARD L. HOLCOMB

Mr. Holcomb has for twelve years been Associate Professor and Chief of the Bureau of Police Science, Institute of Public Affairs at Iowa State University. He is a graduate of the Northwestern University Traffic Institute, and later was on the staff there for two years. Mr. Holcomb was a protection superintendent with Montgomery Ward until 1942, and a Lieutenant in the Kansas City, Missouri, Police Department until 1945, when he assumed his present position.

EVERYONE recognizes the magnitude of the traffic problem. The annual accident-toll of 40,000 lives, more than a million injuries, and three billion dollars is well known. The economic loss from unnecessary traffic delay is not so well established or so well recognized, yet it too must be measured in billions.

Despite this staggering problem, too few police agencies properly apportion their effort between traffic and criminal acitvity; traffic rarely gets the attention it needs. Looked at another way: If in a town of less than 20,000 persons two or three burglaries with a loss of several hundred dollars occurred every night; if about once a week, a criminal beat a victim so brutally that he broke legs, crushed chests or killed one – public indignation would be extreme. Citizens would patrol the street with shot-guns, there would be a move to oust the entire police department and replace it with a force several times larger. All public facilities would be mobilized.

Yet this is the toll we regularly pay to traffic accidents, and almost no one gives them more than passing notice. If just one child were so badly injured by a criminal that life or death was only a matter of chance, every police officer would work around the clock to catch the fiend. But if the same child is similarly injured in a traffic accident, all too often the police effort consists of placing another pin on the spot map and another tally mark in the injury column.

We have come to take traffic accidents as an act of God. There are so many of them that we class them with tornadoes or floods –

things we can do little about. But this reasoning is wrong. Experience in many cities and over a period of years shows that effective programs can reduce traffic accidents. What else explains the fact that year after year some cities have accident rates a fraction of the average for cities their size?

The police, particularly in smaller cities, are the key to solving traffic problems. All planning for accident-prevention through enforcement, education, and engineering must be based on police accident-investigations. There is no point in starting a traffic safety program unless you know what kinds of accidents you have in your community and where and when they happen.

In the small community, the police are usually the only persons concerned full time with traffic. The police have a major responsibility to see that traffic moves safely and freely. Fortunately, they have an excellent method of achieving this goal – traffic law enforcement. Efficient and uniform enforcement of traffic laws is a primary method for reducing accidents and for keeping traffic moving freely.

What We Need To Do the Job

Before talking about what we must do, we should know what we must have to work with. Most police departments, particularly in smaller towns, are undermanned. A constant claim made by the police is, "If you would give us more men and equipment, we would get the job done." There is a place for that plea, but it does not occur until the best possible use is made of the men and equipment already available.

The traffic problem is so serious that it must be attacked right now. Any police department that is doing the best it can with what it has will get more help. Efficiency, full use of every man in the department, come first.

There is no easy answer as to how large any police department should be. One community might have twice the traffic volume of a city of similar size. Generally, small towns adjacent to large centers have a more difficult problem than isolated communities. Averages for the nation can only be a general guide, for an average means that half of the cities will have larger departments, and half

smaller. The *average* for cities between 10,000 and 20,000 population is about 1.25 police officers per 1,000 population. For cities under 10,000, the average is nearer one per 1,000 population.

Again, we must consider just what our problem is. For example, many police officers spend almost all of their time checking, or servicing parking meters. Whether or not this is a police function, the police are assigned that duty. At the same time, these men should not be counted in determining the effective strength of a department. The same is true of clerical help. There is a growing tendency to have a skilled girl replace a police officer at the filing cabinet or the typewriter and release him for the sort of work he does well.

In any case, the quality of personnel is as important as the number of personnel. Modern police work requires the best possible men. This is even more true of the small department where the officer cannot call in a corps of experts when something happens. Time spent in selecting recruits is a good investment. It takes time, skill and effort to make a careful selection: otherwise a department may be saddled with deadwood for the next twenty-five or thirty years. It is better to have a vacancy than a replacement who does not meet standards.

There are well-established methods for selecting men who may make good policemen. The basic steps include: attracting good applicants; an adult intelligence test to determine if the man can think fast and can learn; a background investigation as to his character, his ability to get along with people, and the accuracy of the statements on his application; a planned interview; and a good physical examination. The men who pass these procedures are likely to make good policemen, but experience proves that about fifteen percent will not.

The real test is what the recruit does out on the street as a working policeman. During his probationary period he should be constantly observed by commanding officers and older officers. Those men who do not fit should be dropped at once. This final, practical step in selection will keep a department from having about a sixth of its men unsuited to the work.

Selection is only part of building a force of good men. Sound tenure for all ranks is essential. If a man is doing a job, he should

know that he will continue in spite of changes in administration. He should be free to arrest the mayor's son if he finds him driving while intoxicated.

An adequate salary structure is essential. Police work is rapidly demanding higher types of officers with greater skills. Working conditions are adverse, and should carry adequate compensation. A high rate of turnover because of low salaries is more costly than raising the salaries.

There should be an adequate salary differential between ranks. As a general rule, industry plans to pay a man fifteen percent more than the top man he supervises. This differential is generally recognized in large departments, but too many small departments still pay a sergeant only ten dollars more than his men.

The work week should be in line with industry as should holiday policies, vacations, and other fringe benefits. The development of sound working conditions will attract and keep good men. The additional cost will be more than offset by their performance.

Sound Training Indispensable

The best man is of little value unless he is trained. Training affects both the quality and quantity of police work. A well-trained man not only does a better job, he does it faster. Further, proper training will improve the appearance he makes, for a skilled worker has confidence. Training will improve his own attitude toward the traffic problem and toward the job. Much of this feeling will carry over to the public and their appreciation of the police department will increase. On the other hand, an officer who is unsure of himself falls back on bluff and bluster, and creates public resentment.

While training in a police school is essential, some of the most effective training is done on the street by an older officer. Often a new man is assigned to an oldtimer who only teaches him where to get free coffee, good spots to sneak a nap, or how to shift the work over to other officers. It is most important therefore to choose carefully the officers who train recruits.

A small department cannot set up a formal school under most circumstances, but good books on police work and a few good periodicals will help trainees to learn practical police work much faster

on the street. A good book contains what the author would tell the recruit if he could sit down and talk to him. A sound police library for a small department need not contain over fifteen or twenty books nor cost more than a hundred dollars.

Most large departments have training schools and many of them are willing to accept a few recruits from smaller, nearby departments. Colleges and universities in numerous states offer police short courses. Northwestern University Traffic Institute has a continual schedule of police traffic courses. Available ways to secure training are sufficient to supply the desire for special courses.

The Equipment Needed

A properly organized traffic program for a small city does not require a lot of equipment nor a lot of office space. However, a definite "traffic office" is necessary. This need not be a separate room; it may just be a file cabinet and a set of spot maps. If space is available, a room is desirable. In any case, a definite space should be set aside for traffic records and for handling other traffic business. This is too important a police function to slight.

Traffic is motorized, so the police must be motorized also, with enough vehicles to supervise highway use and highway users, to perform accident investigations, and to deal with parking and congestion. There must be enough equipment to handle traffic peaks; and if motorcycles are used, automobiles should replace them in bad weather.

The number and type of vehicles will depend upon the specific community. A combination of cars, three-wheel motorcycles, and in some parts of the country, two-wheel motorcycles will be needed. Use of stationwagons is growing, particularly in those communities without adequate ambulance service.

It is essential that motor equipment be properly maintained. Keeping a vehicle in top condition costs less than to let it run down periodically and then repair it. It is short-sighted to try to make a set of tires last longer than they should, to buy cheap batteries, or to postpone a tune-up. Police equipment is emergency equipment and in an emergency, the best is none too good.

Police motor equipment used in traffic should be properly iden-

tified. Even in the small department where traffic equipment may also be used for criminal work, cars should be painted and designated so that they are readily recognizable. Easily recognized police cars are a help in making traffic arrests. The public will notice them more often and realize they are on the move more than if they are unmarked. At the same time, if a criminal is looking for a police car, he will spot an unmarked car about as quickly as a marked one.

Police radio, essential to all departments, is probably more important to a small department than a large one. All police equipment should be equipped with two- or three-way radio. There are problems of maintenance in the case of three-wheel motorcycles, and even more with two-wheelers. At the same time, increased operational efficiency will offset the cost.

Every police vehicle should carry adequate first aid equipment. This should include a full-sized first aid kit (the "unit" type is preferred), a serviceable blanket, and a tarpaulin or waterproof covering.

At least one car – even in the smallest department – should carry complete accident investigation equipment. This equipment is not expensive, but is necessary for proper investigation. Much of it can also be used for criminal investigation. A complete list of this equipment is given in *The Traffic Accident Investigators Manual for Police* published by Northwestern University Traffic Institute.

A number of mechanical or electronic speed check devices are in regular use. They make the apprehension of speeders simpler and safer than the method of pacing with an automobile or a motorcycle. They are also more accurate. However, from the standpoint of practicability and cost, the use of a stop-watch graduated in tenths of a second should be considered. Cars are timed between two lines painted on the pavement. These lines are usually located at intersections with high accident rates, school crossings or considerable pedestrian use.

If chemical tests are used to determine intoxication, the department will need no special equipment. While the breath test does require special equipment, it can be operated by a trained officer and the cost over a period of time will be less than if a technician must be employed. More important, the breath tests give an

immediate answer. If a driver with all the observable symptoms of intoxication is discovered to have only a very small amount of alcohol in his body, immediate medical attention is essential for he is ill or injured and not intoxicated.

Such cases are frequent enough to justify the use of the breath test for that reason alone. From a practical standpoint, chemical tests will more than pay for themselves through increased pleas of guilty, with consequently less time spent in court. They are essential to any traffic police program.

It is of course necessary to have sufficient files, requisite printed forms, spot maps and other routine office equipment. The amount needed depends entirely on the size of the department and the volume of business. In any case, expenditures for equipment to increase the efficiency of operation is always a good investment.

Police are often accused of being hard on office equipment. City officials point out how much faster the police wear out equipment, how much more often their station requires redecorating. They forget, and many times the police fail to tell them, that while city offices are open only forty to forty-four hours per week, the police department uses their equipment the full 168 hours per week, or four times as much.

Other equipment – not exclusively for traffic – will make the overall police operation more efficient and save time and effort that can be directed to the traffic problem. Many departments record the radio log. This method eliminates the written record and is more accurate. Some departments use dictation machines for making different kinds of reports. The officer can dictate in the station, or better still, over a telephone while still on his post. Officers who have trouble writing reports are often able to dictate an accurate and complete report very rapidly.

Who Makes Traffic Arrests?

The basic rule is: All officers should enforce traffic laws just as they would enforce other laws. Any officer would immediately arrest a person he found breaking into a house, but few burglaries cause as much loss of property as a property damage accident; almost no burglaries result in death or injury. Similarly, every

police officer should make an arrest for a traffic violation occurring in his presence. If he fails to do this, citizens will notice this failure and the entire traffic law enforcement program will suffer.

There is an exception to this general rule: Officers in plain clothes and in unidentified cars should make arrests only in serious violations. Also, they should not allow a traffic arrest to interfere with a more important assignment. Obviously, they should not stop on a call from a bank robbery to make an arrest in any but the most flagrant traffic violation. At the same time, it is difficult to understand how some officers can spend their tour of duty without seeing many violations for which they should make arrests.

Specialization in the police field can be of two types: The first is exclusive specialization to a degree that the officer does no other type of work. The other type is supplementary specialization. Here a man usually performs general police duties, but when necessary, is able to perform such functions as photographing accidents or crime scenes. In small city departments, if men specialize at all, their specialization is usually of the supplementary type.

Even the smallest departments will have some supplementary specialization. A good example is the officer who marks cars and checks on parking. Because of the nature of his duties and the hours of performing them, this will take eighty to ninety percent of his working time. However, few other jobs require this degree of specialization in a smaller department.

It is difficult to determine how large a department should be before it has a traffic division. Depending upon the individual situation, the following points will help in making a decision.

1. If a traffic division would improve operation, the department should establish one.

2. If traffic requires the full-time services of one man on one or more shifts, a division might well be established. It must be remembered that these are general rules and should serve only as a guide for individual judgment.

Experience shows that about four men out of ten should work on traffic. This does not mean that every ten-man department should have a traffic division, but that the time spent on traffic by all members of the department should average the equivalent of four full-time men.

In setting up a traffic division, the important point is to fix responsibility. One or more officers should have a definite responsibility for performing traffic functions. This may be only on a part-time basis. In the smallest departments, the chief might perform this function. Or it might be assigned to an officer who has shown special interest and has received training.

His duties should be to file and analyze traffic records and then, acting in a staff function, plan the traffic control accident prevention program. As the department increases to the point of requiring a full-time man for this work, he should be given an increasingly higher rank. The man in charge of traffic should have a rank equivalent to heads of other divisions.

Assigning Police Duties

Almost no police department has sufficient manpower. Everyone complains about being understaffed. At the same time, a few departments make full and efficient use of the manpower they have. Able police officers perform such non-police functions as repairing parking meters, painting streets, or acting as full-time court officers. As pointed out previously, few policemen make good clerks. A civilian at two-thirds the salary will generally do a better job and put a good man out on the street where he belongs.

Special events cause some departments to lose operating strength. Funeral escorts, sporting events or dances can be handled by off-duty policemen who are compensated by the person desiring this additional police service. Officers should be detailed to school crossings only as a last resort. The use of proper school crossing signs, school-boy patrols or special officers (often older men or women) will do as good a job of handling the situation as a regular police officer.

The proper use of one-man cars will greatly increase police efficiency. At the outset it should be stated that the use of one-man cars is not an economy measure, but rather a good way of making full use of the force available. It will cost more money, but will more than repay the cost in increased coverage and efficiency. To operate a one-man car system properly, four rules must be followed:

1. The number of men on the street must remain the same or

be increased, and the number of cars must be doubled at least. If a department has three two-man cars, it should have at least six one-man cars.

2. The men must be trained not only in the operation of one-man cars, but in all phases of police work.

3. There must be a good communication system. The person dispatching cars must have firm grounding in the job so that proper coverage can be given to all calls.

4. There must be enough cars to reinforce each other. One man should never be sent alone on a call requiring two or more men. This usually means a minimum of three cars. Standby equipment should be available so that mechanical failure does not keep an officer off the street.

Wide experience proves that one-man cars, if properly operated, are safer than two-man cars. Older officers who have never seen a good one-man car operation will argue at length about the hazards, but their arguments are based on their own limited experience, not on the combined, statistically proved experience of many departments that have successfully operated one-man cars.

All police assignments should be reviewed periodically to make certain no duties have become outdated or performed in another way more efficiently. Foot beats may be outdated in some cases. The tendency is to eliminate them. Fixed posts may often be eliminated; for example, some cities station a police officer at city offices, the hospital, or the railroad station just because they have always had an officer stationed there, not because he is needed any longer.

Necessary Police Functions

The police have a definite responsibility in obtaining proper signs, signals and markings. Ideally, the placement of devices to facilitate traffic flow should be the function of a traffic engineer. From a practical standpoint, if there is no engineer, the police must do the job.

The police also have a part in obtaining proper laws and ordinances. They are nearest the problem and the first to be aware of laws that are not adequate for the situation A model city ordinance is available for police to determine how well their own ordinance

conforms with the model. They should then obtain substantial conformance to have a firm basis in law for their operations.

A major police responsibility – one that is sometimes overlooked – is the enforcement of laws and ordinances designed to promote the flow of traffic. Restrictions against double parking, improper loading and unloading, parking in prohibited zones, rules for turning movements and pedestrian movements must be enforced to reduce congestion. At the same time, these regulations protect lives and property because their enforcement reduces accidents as well as improves traffic movement.

From a practical standpoint, relatively little enforcement is needed so long as the police demonstrate that they have a policy of strict and continuous enforcement of regulations. Too often traffic restrictions are the victim of sporadic drives that continue only until the local businessmen's association complain that they are driving customers away. A continued program soon proves to businessman and customer alike that safe, freely moving traffic benefits everyone.

Accident investigation is the key to solving the traffic problem. Facts learned from these investigations are the only sound basis for an accident-prevention program.

Actually, the two reasons for making accident investigations are, first, to get facts that serve to make traffic safer; and second, to discover whether or not a violation caused the accident. Then evidence may be gathered to support the arrest and obtain the conviction of violators who failed to obey the traffic laws voluntarily and thereby caused the accident.

The major reason why police make traffic arrests for moving violations is to prevent accidents. If speed were not hazardous, no one would care whether cars went ninety miles an hour on Main Street. Thus, when a violation actually results in an accident, it is all the more important to arrest and prosecute the violator.

Hit and run accidents are often double violations – the violation that caused the accident and the violator's leaving the scene. Police action is obviously necessary. If the police fail to solve most of these cases, hit and run accidents would increase overnight. Investigation in these cases always get considerable public assistance because no one has any sympathy for a hit and run driver.

Accident investigation is of little value unless a careful accident report is written, filed so it can be easily referred to, and then used. The finest system of investigation and filing reports is valueless unless the facts are applied. The standard system is to file by location. If you don't know how to do this, the National Safety Council has a memo that they will send you that tells all about it.

Traffic Law Enforcement

We can't make arrests for all violations that occur. There are too many of them. As a result we must concentrate on making arrests at the locations where most accidents happen and at the times and for the violations that cause them. This is called "selective enforcement" and the importance of applying this is as essential to the smallest department as to the largest. Planning selective enforcement is based on the accident facts that we have learned from accident investigations. If we know the where, when, and what of accidents in the past, we can predict what will happen in the future. Accident experience, like other history, tends to repeat itself.

The first step in setting up selective enforcement is to make a spot map showing locations and types of accidents. Here again a National Safety Council memo shows details. In addition, charts showing the time of day and the day of the week for accident-occurrence are made up. Accidents reach peaks at certain times of the day, and these peaks will be higher certain days of the week. These are the times you should have most enforcement.

From a practical standpoint, changes in the accident-pattern from day to day are not specially important except that Saturdays and Sundays are different from other days. In most locations, accidents will be higher on the weekends. Next, you should have a tabulation of the types of violations that most frequently cause accidents. Your enforcement should be concentrated on these violations.

These records should be based on accident figures for at least one year to be reliable and not show merely the effects of chance. In smaller cities, a two- or three-year period may be necessary because of fewer accidents.

After you have made up the charts showing when accidents are happening, you should try to assign officers so that you have the largest number of men working when most accidents occur. This is hard to do in a small department. You can never get your manpower figures to fit the accident times.

Yet if half of your accidents occur between 5 P.M. and 1 A.M., half of your officers should be working then. The plan of breaking a force into three shifts of equal size has been long out of date. Neither the traffic nor the crime problem is equally distributed over twenty-four hours. Therefore enforcement shouldn't be.

Officers should be assigned to locations where accidents occur in addition to times accidents occur. If you let the officers patrol wherever they want to, they will pick the most pleasant streets, not high-accident streets. Officers should be assigned to an area, or to one or more specific streets.

In the smaller towns, they have to cover the entire town but they should be informed of the high-accident locations and encouraged to work through them as often as they can. You can check their performance by seeing whether their arrests occur at the points where accidents occur or whether they are making arrests at low-accident locations where violations are easy to find.

Officers should be told of types of violations causing accidents. It is easy to get the feeling that you know which violations are causing accidents and where and when they occur. Yet if you don't use maps and graphs to show you the problem, the chances are you will be wrong.

This point must be emphasized, the work of the officers constantly reviewed to make sure they are following the accident picture and not their personal idea of what is going on. They should not, however, follow these data to the exclusion of all other traffic arrests. Citizens learn whether they can expect an arrest wherever or whenever they violate the law.

Uniform Enforcement

No doubt we need uniformity in our traffic activity. There are uniform laws and ordinances either in effect or available to be followed. Signs, signals, and markings usually follow well-standardized

procedures. Relatively few accidents are the result of a driver's failure to know a law or to understand a sign. At the same time, it has only been in recent years that we have progressed in uniformity of enforcement. It does little good to have uniform laws and signs as long as each officer has his own idea of what sort of enforcement should be applied to each particular law or control device.

The uniform enforcement plan developed in Michigan is now used by many cities of all sizes. This plan has been described in detail. Chapter 16 of "The Judge And The Prosecutor In Traffic Court" (published by the American Bar Association and Northwestern University Traffic Institute) explains the method in detail.

Briefly, this plan has the officer score the seriousness of a violation directly on the traffic ticket. The score then determines the action the officer takes. This system should be used by every police department. It has proved its value. It is simple to use and practical.

Enforcement Drives Not Effective

Enforcement should be a steady, planned, and continuous effort. Drives, crackdowns may get brief publicity but won't reduce accidents. It takes a period of from one to four months for citizens to know you mean business and are always going to arrest for every violation. Short-term efforts don't get this message over. They merely waste time. The public – at least the more vocal – will complain every time enforcement tightens. Some city administrations – and, unfortunately, some police officials lose courage with the first complaints. Others learned years ago that if you continue your program the public learns that the way to avoid arrest is to comply with the law.

In a few months, you will find general acceptance of increased enforcement. It is during the first few weeks that most of the screaming occurs. Ride that period out, and the few soreheads will quiet down and everyone else will be happy about your department's doing a good job.

There must be volume enforcement to be effective. Small enforcement will accomplish nothing. It is like trying to drive a nail with light hammer taps. You can't do it. There is a universally recognized method of measuring the *amount* of enforcement – the

enforcement index, arrived at by dividing the number of convictions for hazardous violations by the number of personal injury plus fatal accidents. You can express it this way:

$$\text{Enforcement Index} = \frac{\text{Convictions for hazardous violations}}{\text{Personal injury plus fatal accidents}}$$

Moving violations that might cause accidents are the ones counted. Parking violations, license violations, and similar violations that would not *directly* cause an accident are omitted. Convictions rather than arrests are used because while an arrest without a conviction has some effect, it is still not the goal. It indicates someone is not doing his job. Indeed, many arrests without convictions result in poor enforcement. Personal injury accidents – not the number of persons injured – and fatal accidents, not the number of people killed, are used because reporting is more accurate in these classes than in property damage accidents.

In large cities, this index can be figured every week because there will be enough accidents and arrests to be statistically reliable. In a small city, you may be able to get a reliable figure about every two months. A low-accident *month* would make the index look better than it really is, a high accident month, worse. If you believe the accident experience for a month has not been typical, take one twelfth of the total number of accidents for the previous year and divide this into your convictions for moving-violations for the month. This will give a more reliable figure.

How Much Enforcement

In most cases, an enforcement index of ten is the lowest of value. A continued index below ten means that enforcement is doing nothing. An index between ten and twenty indicates a level of enforcement that will reduce accidents. Brief increases as high as sixty are probably all right on a temporary basis, but usually a continued rate of sixty is too high. In any case, do not worry about fluctuations in the index for smaller cities so long as the index figured on a yearly basis is up to a level that will do some good.

More enforcement is necessary to bring down the rate than to

hold it down. If you have not had a high level of enforcement, an index of from thirty to sixty may be necessary *for a time* to get a reduction. Then, a lower index can maintain the reduction.

There are two ways to increase the enforcement index. The obvious way is to increase the number of convictions. However, the other, and more desirable way, is to reduce the number of accidents. This is what we are after. Convictions are the means to the end.

Special Enforcement Problems

Officers should take advantage of every contact with drivers to check such things as windshield wipers, lights, glass, and play in the steering or brakes. If this is done systematically a great many vehicle defects will be eliminated.

A definite policy of enforcement will help when defects are discovered. If there are serious defects where deliberate neglect is obvious, an arrest should be made. Proof of correction should be required before the case is disposed of by the court.

This sort of enforcement is necessary even though a city or state may have compulsory vehicle inspection.

Non-residents should be expected to comply with the law, the same as residents of the community. Their violations can cause accidents too. The only exception might be certain minor, non-dangerous violations.

No particular group of drivers should be excused from obeying the law. The policy of not being strict with professional drivers is unsound. As a matter of fact, professional drivers rarely violate a law unknowingly. Drivers of government-owned vehicles should be expected to obey all laws. In the case of city-owned vehicles it is poor public relations to allow their drivers to operate improperly.

All drivers of vehicles owned by the federal government are expected to obey local laws. While certain of these vehicles are not subject to local regulation, for example, postal trucks, every post-master is expected to act when informed that his drivers are not obeying laws.

The armed services are particularly interested in seeing that service men obey traffic laws for experience is showing that large numbers of men with valuable training are being killed in traffic

accidents. The services want civil police to be at least as strict with the men in uniform as with civilians.

Getting the Violator into Court

Before establishing any procedures for the use of tickets, citations, or physical arrests for traffic violations a careful review of the law is recommended. Most states have minor legal technicalities that must be complied with. Failure to do this will result in losing cases that should have brought a conviction.

Definite policies should be established on when to issue a ticket and when to book the driver. Bonds should be established on a scale that will allow the booking to be completed efficiently so the officer can get back on the street. Some leeway must be allowed officers, but they should be furnished with a written policy as a guide.

A careful follow-up should be made on all cases involving a driver's failure to appear in answer to a ticket or citation. This situation should never be permitted to get out of hand by allowing unsatisfied tickets to build up. The public will soon learn of this and the problem will be even more difficult. The usual procedure is to send a post card to drivers who fail to respond. If they don't respond, a letter is sent. Some departments then send a registered or certified letter. They have found the return more than enough to pay the cost.

A list should be made of drivers who fail to respond to two or more tickets. Copies should be given to all officers. If they discover the car on the street, definite action can be taken. If legally possible, it is a good practice to impound the vehicle. Many persons who evade tickets are not local residents, but they may be salesmen who return at regular intervals. A weekly or monthly check in the area where the tickets were written may lead to identity of the evader.

The Police—the Courts—and the Violator

Good prosecution is an essential part of any traffic law enforcement program. Failure to get conviction will seriously hamper any program. In many cases, this failure is not the fault of the police. The

prosecutor may not be doing his job, or the judge may fail to convict following proper evidence for a number of reasons. However, many cases are lost through lack of police evidence. There may have been a clear cut violation, the arrest may have been proper, but the police may have failed to present the case properly.

Much of the success of a prosecution depends on thorough case preparation. The officers should be trained in traffic laws to recognize the elements of the offense and gather evidence to support each of these elements. Officers should be trained in the law of evidence. Evidence that does not get into court is no evidence at all. Police should be instructed in the proper use of notes and reports for evidence. There is a tendency for officers to believe they will be able to remember all of the details. The use of standard forms – the uniform traffic ticket, the standard accident investigation forms, and the alcohol intoxication report forms – will greatly simplify this job, and improve the ability of the officer to testify.

All but minor or routine recent cases should be reviewed with the prosecutor before trial. A good prosecutor will want to do this. The defense is certain to be prepared; it is essential that the prosecution be equally well prepared. If prosecutors think this wastes too much time, it can be pointed out that every time they win a contested case, many defendants decide to plead guilty instead of fighting it; a good job of prosecution will cut down the number of cases they have to try.

The prosecutor who handles traffic cases should be specially trained for this work. Courses are held at many points around the country under local auspices. City attorneys will benefit from such training in prosecuting traffic cases.

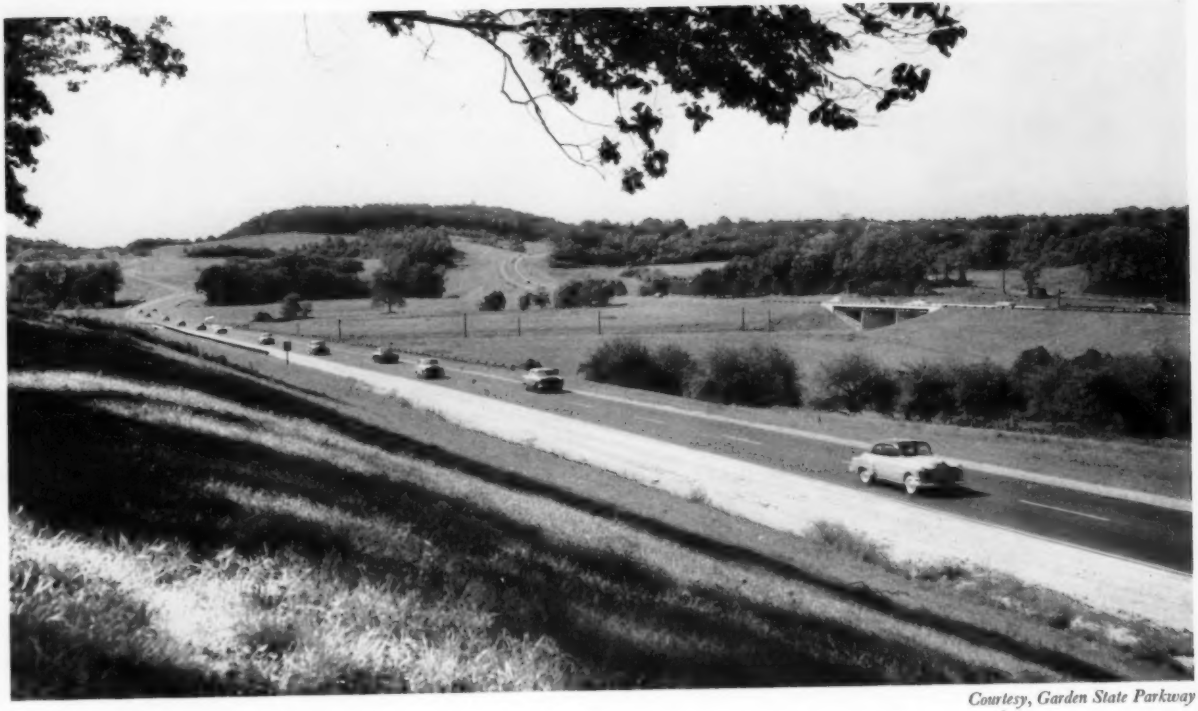
Co-operating for an Effective Program

No traffic program can succeed unless the public is fully behind it. This important point is often overlooked. Enforcement officials see so well the necessity for their program, they often forget the public does not recognize its importance equally well. They fail to let the public know *why* they are doing what they are doing. As a result, some worthwhile programs actually generate public antagonism. There is no good reason for this because the public will co-operate if given the facts.

Gaining the co-operation of the public is not an easy job, but it must be done. Experience in many cities proves that the public will accept a high level of traffic law enforcement if they are first prepared for the enforcement program and if the program is a good one. The police must be able to support their program. To do this, they must demonstrate that they have planned on the basis of accident experience, that the arrests they make are designed to prevent accidents, and that they actually prevent accidents.

The overall traffic problem, made up of accidents, congestion, and parking difficulties, is extremely complex. There is no single, simple solution. Any final solution must result from the combined work of a wide variety of agencies and individuals.

Sometimes, particularly in smaller cities, it may seem to the chief of police that his department is the only agency that is actually doing anything about the traffic problem. He knows a lot of people are complaining and talking about it, but he feels alone in doing something about it. When this occurs, the police must gain the support of other city officials, state officials, the public and all others who can help. Only in this way can they reach a final solution.



Courtesy, Garden State Parkway

New Jersey's Garden State Parkway provides luxurious scenic travel and outstanding safety because of its exceptionally wide center mall.

The Garden State Parkway: Its Growing Economic Significance

D. LOUIS TONTI

Mr. Tonti is Executive Director of the New Jersey Highway Authority. Previously, he was vice president of the American Bridge, Tunnel and Turnpike Association, and a former executive of Public Service Transport.

NEW JERSEY citizens have been tossing the words "boon" and "boom" around the Garden State Parkway very freely the last two years – apparently with solid grounds for the economic exultation.

Although in full operation only thirty months, the Parkway has already indicated that it is the road to New Jersey's future. The evidence comes not only from tremendous traffic figures, but also from economic gains and major undertakings off the Parkway.

Newspaper headlines have told a part of the story:

"PARKWAY BOON TO CAPE MAY"; "NEW CITY TO RISE IN PINELANDS STRADDLING PARKWAY"; "$3,000,000 SHOPPING CENTER FOR WILDWOOD DIRECT RESULT OF PARKWAY"; "SHORE BOOM ACCELERATED BY PARKWAY"; "PARKWAY SEEN AS BOON TO HOME BUYERS"; "NORTH JERSEY SHRINKS VIA PARKWAY TRAVEL."

Another part of the story can probably be found in the assessed valuations of the municipalities and counties through which the parkway runs.

Despite the fact that Parkway construction was just substantially completed and the loss of ratables in land needed for the superhighway was still fresh, only one municipality along its path suffered a decrease in assessed valuation between 1954 and 1955.

Indications are that the Parkway has generated new developments to offset the temporary loss of ratables, although it is recognized that the Parkway cannot be given full credit for increased ratables. It is much too early to determine how important a factor the Parkway is.

The full picture will probably not be drawn for several years, when new shopping centers (like Macy's and Allied Stores) and housing projects along the Parkway are a reality and substantially add to the ratables.

All ten counties through which the Parkway passes showed a tremendous increase in ratables between 1955 and 1954 and between 1954 and 1953, when the superhighway was being built. There was an increase of $160,052,804 in net assessed valuation for the ten counties between 1954 and 1955; and an increase of $139,716,275 between 1953 and 1954.

The Parkway itself is a $305 million project linking the northern metropolitan and southern seashore areas of New Jersey. It extends 164 miles between Route 17, Paramus, in Bergen County and Cape May at the southern end of the state. It is expected to handle more than sixty million vehicles in 1957. The traffic to date indicates it will definitely live up to expectations.

A dual highway with one of the widest center islands separating northbound and southbound traffic, the Parkway has been acclaimed for its outstanding safety. Its first calendar year of full operation (1956) produced a record traffic volume of approximately fifty million toll-paying vehicles but left only a fatality rate of 1.3 in its wake. There is no question that safety adds up to economic dollars and cents. We intend to keep the register ringing in that respect.

Tests Prove Parkway's Benefits

For an official barometer of the economic benefits afforded by the Parkway, the report of independent researchers who made a test run on the toll road and on the shortest alternate route compares the results.

The tests showed the Parkway to be quicker and safer than parallel state highways and an indication that it may even be cheaper – despite its tolls.

The Parkway route resulted in a savings of 40 percent in fuel costs alone and a savings of about nine muintes in time for a 13-mile distance. That was attributable to the Parkway's having no intersections at grade or traffic lights except at one location near the southern end in Cape May. This single exception is on the old

Cape May Court House bypass strip built by the state highway department several years ago.

The New Jersey Highway Authority, which built and operates the Parkway, was created in 1952 to complete the Parkway from Paramus to Cape May after initial progress by the state highway department proved to be too slow for modern transportation needs. The department was limited in the availability of funds, so the Authority was set up with power to issue bonds to finance immediate construction of the entire project.

As it now runs, the Parkway covers ground in ten of New Jersey's twenty-one counties. Those counties from north to south are: Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Ocean, Burlington, Atlantic, and Cape May. The route links metropolitan areas – Newark, Paterson, Clifton and the Oranges – with the seashore areas of Asbury Park, Atlantic City and Wildwood.

The Parkway provides the first direct link between those much-visited and heavily-populated places in New Jersey. But in doing so, it also provides something more – luxurious, scenic travel all along the eastern border of New Jersey. The Parkway was designed as an unending park through ten counties.

Tangible Results Show Economic Gains

The ribbon of black-and-white pavement has cut hours off the old travel time between those otherwise distant places. Atlantic City is now about two and a quarter hours away from Newark by Parkway whereas it was three and a quarter hours on other highways. The result is three-fold:

1. Motorists can easily move to the southern areas of New Jersey and commute to their northern offices or factories. 2. Pleasure-seekers need not plan overnight trips in order to spend a day at the shore. 3. Businesses can locate practically anywhere along the Parkway and still be accessible to or from any point in the eastern part of the state.

The results have proved tangible. New industrial, mercantile, and residential developments have sprung up all along the Parkway. Southern New Jersey particularly has been discovered. New people arrive there constantly – people who may have lived for

years in northern New Jersey without ever thinking of taking a look at their neighbors.

But the story is far from finished. The Highway Authority has an additional project to make the Parkway a vital link in travel along the nation's Eastern seaboard. A connection with the New York State Thruway at the Parkway's northern end is scheduled to be completed this month.

This addition will open the door even wider to development and resulting economic progress. Out-of-state people will be able to discover areas previously shut off because of inadequate road facilities and connections.

Behind those headlines heralding the Parkway's potentialities were these salient facts:

1. A New York syndicate purchased more than 15,000 acres of pineland straddling the Garden State Parkway in the heart of Ocean County with plans to build homes for 200,000 persons, as well as industrial plants, shopping centers, hospitals, churches and schools. The land is in the Lakehurst and Toms River areas. The land purchase was one of the biggest in the metropolitan area in a decade.

2. Cape May businessmen a year ago reported a 300 percent increase in hotel registrants listing addresses from the upper reaches of the Parkway and credited the Parkway with generating an unprecedented prosperity wave. The Cape May area during the Parkway's first summer of full operation reported extensive new construction and bank deposits on the rise.

3. A Philadelphia and New York realty firm announced it would develop a $3 million one-stop shopping center in Wildwood, and stated frankly that the mart is a direct result of the Parkway. The firm's president commented: "The Parkway with its planned connections . . . will spark a fabulous growth for this beautiful part of the country."

4. A prominent realtor commented: "The Parkway has proved to be a boon to home-buyers from the northern metropolitan areas of New Jersey because it permits them to commute to their place of employment in less time than in built-up city and suburban areas." Other realtors have echoed those opinions in addresses and articles.

Real estate sections of New York and New Jersey newspapers regularly feature home buys made more attractive by the proximity of the Parkway.

Parkway Creates New Employment

The fact is that the Parkway has added up to thousands, if not millions, of dollars for resort owners, merchants, and new business investors. But it also means economic gain for the individual motorist.

One can hardly gauge the extent to which the Parkway has generated new employment both on and off the superhighway. Besides the Authority's own force of toll collectors, maintenance workers and other personnel, hundreds staff the service-area restaurants, snack bars, gift shops and gasoline stations for Parkway concessionaires. Thousands have found jobs in new business enterprises and industrial plants spurred by the Parkway construction.

On the lighter side is the establishment of new entertainment and amusement spots along the Parkway. An example is Storyland Village, the fascinating wonderland for children near Asbury Park. Its owners frankly state that the Parkway prompted their business venture in that location.

Sports-wise, the three race tracks near the Parkway are counting on larger attendance and betting now that the superhighway can carry horse-racing enthusiasts from as far away as New York City in only a few hours. Monmouth Park at Oceanport has particularly felt the effect of the Parkway's proximity as it counted record business.

In northern New Jersey at the very top of the Parkway, major shopping centers are being built by nationally-known firms. The centers could well divert considerable business from New York emporiums and bring a tremendous volume of new money to New Jersey.

Another facet of the economic picture is the probable long-range effect the Parkway will have on the resort business. Customarily a summer business only, the seashore resort industry is now pointing toward year-round operations. With the Parkway shrink-

ing the distance from urban areas, the seashore may well find it profitable to keep the doors open throughout the four seasons.

There are indications of such a change already, but a much broader view of the effect is expected in the near future.

County-wise, of course, the main interest might be in the increased ratables. Just to mention a few of the net increases between 1954 and 1955, Bergen showed an increase of $44,248,533; Essex, $28,235,391; Union, $28,515,058; Middlesex, $19,989,603; and Monmouth, $8,478,247.

Among the municipalities through which the Parkway runs, Clifton reported a $5,000,000 increase; East Paterson, $1,250,000; Dover Township in Ocean County, $1,000,000; Sayreville in Middlesex County, a $4,000,000 rise; and Union, a $5,500,000 increase.

The lone drop among those municipalities directly in the Parkway path was reported for East Orange in the heavily populated Essex County area.

The over-all figures tended to substantiate the Authority's report in 1955 that "many municipalities along the Parkway were finding concrete evidence that their loss of ratables from the highway construction program would be only temporary and would in fact be more than overcome by new and more desirable developments."

The evidence, of course, has become even more concrete since then.

Changing Position of Retail Trade In Central Business Districts

SAMUEL C. MCMILLAN

Professor McMillan is head of the department of marketing and Assistant Dean of the School of Business Administration at the University of Connecticut. He is also a member of the faculty of the Graduate School of Sales Management and Marketing at Rutgers University. Mr. McMillan was associated with the firm of Alderson and Sessions, Marketing and Management Counsel, and served as consultant to other organizations. Several studies on shopping habits in Connecticut were conducted under his direction. He is a member of the American Marketing Association and is currently serving on the Committee for the Teaching of Marketing.

THE central business district in our largest standard metropolitan areas has been declining in importance as the center of retail trade transactions. The reasons for this changing position are varied. The author's purpose is to consider them and to determine how much damage has been inflicted on the central business district as far as its position in retail trade is concerned.

Information showing the status of the central business district is available – for the first time – in the U. S. Bureau of Census Report on Retail Trade for 1954.(1)* Prior to the 1954 census, information on the number of stores and sales volume in downtown business districts, while collected, was not published.

In addition to the 1954 information on this subject, the Bureau of Census made available similar data for 1948, making it possible to compare the two most recent census years. To clarify the types of comparison being made for these two census years, it is first necessary to consider the structure of a metropolitan area and the limits of its component parts.

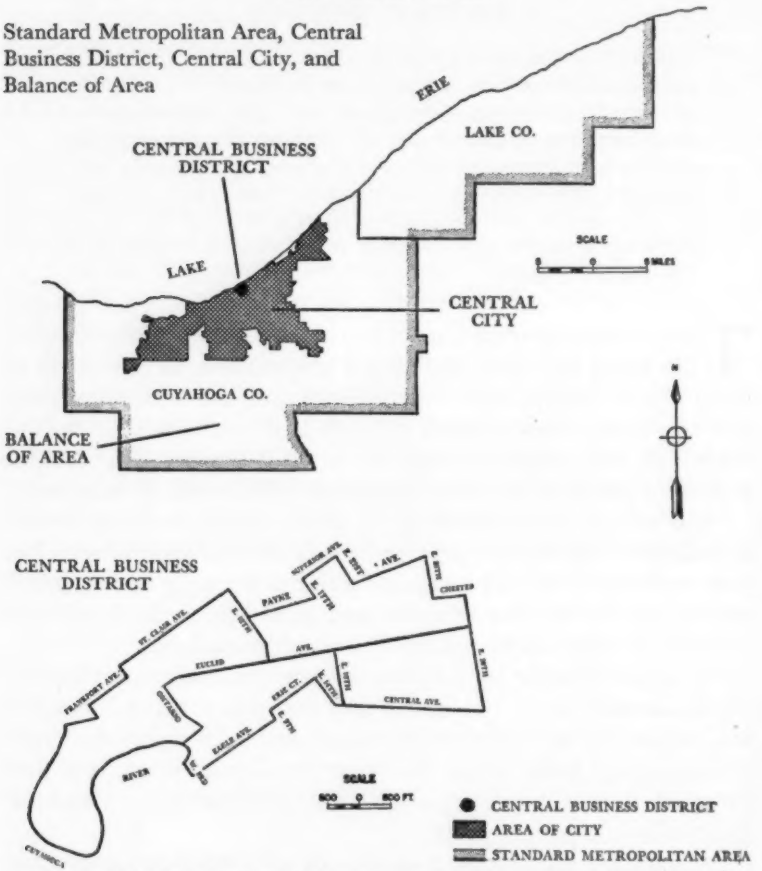
A standard metropolitan area is an integrated economic unit with a large volume of daily travel and communication between a central city and the outlying parts of the area. Each standard

* Numerals in parentheses refer to notes at the end of the article.

metropolitan area consists of one or more counties except for New England where the metropolitan areas were defined on a town rather than a county basis.

CLEVELAND, OHIO

Standard Metropolitan Area, Central Business District, Central City, and Balance of Area



SOURCE: *United States Department of Commerce, Bureau of the Census, 1954 Census of Business.*

Figure 1

Figure 1 is an example of a standard metropolitan area, Cleveland, Ohio. The components of a standard metropolitan area are:

the central business district, the central city, and the balance of the area. The central business district is that section of the central city usually referred to as downtown. It is the place where retail trade historically has been concentrated.[1] It is also a part of the central city; consequently, the central business district and the central city are not mutually exclusive.

The central city limits are usually determined by its political boundaries. The difference between the boundaries of the central city and the standard metropolitan area will be referred to here as the balance of the area. Each of these component parts is identified in Figure 1.

Twenty-four Areas Studied

Criteria for selecting standard metropolitan areas for use in this study were the following:

1. Availability: information had not been released by the Bureau of Census for all of the metropolitan areas that will eventually be covered.

2. Complete disclosure: only those standard metropolitan areas on which the information was complete are included in this article. At least three additional standard metropolitan areas – Baltimore, Maryland, Memphis, Tennessee, and Minneapolis–St. Paul, Minnesota – would have been included if complete information had been available.

3. The size of the standard metropolitan area: an effort was made to include only the largest standard metropolitan areas.[2] Table I shows the twenty-four standard metropolitan areas covered in this study, with the 1950 population and retail sales for each.

1. Many large cities had no officially defined area representing their central business district when the census started on this project. In such cases, the delineation of the central business districts was accomplished with the cooperation of census tract committees in the cities covered in the program. In most cases the central business district was delineated to correspond with census tracts. It was realized that this tract basis of delineation might lead to the inclusion of some land area not properly within a portion of what should be in the central business district. It appears the established that boundaries for central business districts in most instances provides for physical growth of the retailing industry.

2. It was hoped that the same thirty-two metropolitan areas could be covered in this article as were discussed by the author in an earlier analysis of the central city. Samuel C. McMillan, *Decentralization of Retail Trade*, Traffic Quarterly Vol. 8, April 1954, p. 213, The Eno Foundation, Saugatuck, Connecticut. At the time this current article was written, the Bureau of Census had not yet released information for Columbus, Ohio; Kansas City; Rochester; and Toledo.

An earlier study, based largely on information from the 1948 Census of Retail Trade, analyzed the changing position of the cen-

Table I

POPULATION AND RETAIL SALES IN 24 STANDARD METROPOLITAN AREAS

Area	*Population–1950*	*Retail Sales–1954 (Add 000)*
New York–Northeastern New Jersey	12,911,944	$15,433,091
Chicago, Ill.	5,495,364	6,898,919
Los Angeles, California	4,367,911	6,903,325
Philadelphia, Penn.	3,671,048	4,060,514
Detroit, Mich.	3,016,197	4,106,958
Boston, Mass.	2,369,986	2,855,379
San Francisco, Calif.	2,240,767	2,958,649
Pittsburgh, Penn.	2,213,236	2,212,049
St. Louis, Mo.	1,681,281	2,016,650
Cleveland, Ohio	1,465,511	1,923,462
Washington, D. C.	1,464,089	1,981,956
Buffalo, N. Y.	1,089,230	1,330,466
Cincinnati, Ohio	904,402	1,119,117
Milwaukee, Wis.	871,047	1,144,581
Houston, Texas	806,701	1,194,837
Seattle, Wash.	732,992	947,974
Portland, Oreg.	704,829	874,446
New Orleans, La.	685,405	721,122
Atlanta, Ga.	671,797	881,086
Dallas, Texas	614,799	1,030,850
Louisville, Ky.	576,900	707,802
Denver, Colo.	563,832	847,353
Birmingham, Ala.	558,928	532,714
Indianapolis, Ind.	551,777	794,270
TOTAL	50,231,973	$63,468,570

SOURCE: *Donald J. Bogue, Population Growth in Standard Metropolitan Areas, 1900–1950 (December, 1953) pp. 61–65; Bureau of Census, Central Business District Bulletins for each city. See Reference No. 1, p. 372.*

tral city in the thirty-two largest standard metropolitan areas of the United States. This study showed that from 1939 to 1948 the central city declined in relative position for retail sales of the standard metropolitan area.

In 1939, 71.6 percent of all the retail trade sales volume was done in the central cities; by 1948, this total had dropped to 68.1 percent. The present study reports on only twenty-four of the thirty-two standard metropolitan areas in the previous study. In 1948, in these twenty-four areas, the central cities accounted for 66 per-

cent of the retail sales volume; in 1954, the figure dropped to 56 percent.

Table II shows the changes that occurred from 1948 to 1954 in number of stores and sales volume for these twenty-four large standard metropolitan areas. These areas contained about one-third of the population of the United States in 1950 and accounted for almost two-fifths of all retail sales in 1954. The information in Table II is organized to reflect the changes in the standard metropolitan areas as a whole, the central business district, the central city, and the balance of the area. Of greatest interest here is the information that shows the changing status of the metropolitan area and its various components, but especially the central business district.

In 1948, 41,680 stores were situated in the central business districts of the twenty-four standard metropolitan areas. By 1954, this number had dropped to 38,858, representing a decline of 6.8 percent. The 1948 total dollar sales volume in these twenty-four central business districts was $9,469,067,000. By 1954, it had climbed only to $9,516,112,000, an increase of 0.9 percent.

The central business districts accounted for 7.7 percent of all the stores in the standard metropolitan areas in 1948, and by 1954 the percentage had dropped to 7.4. Sales volume in the central business districts accounted for 20 percent of the total in these twenty-four areas in 1948, but by 1954 it had dropped to 15 percent.

Sales Volume Outside the CBD

What had happened in the other parts of these twenty-four urban areas? The total number of stores in all standard metropolitan areas decreased by 3.1 percent – from 544,319 in 1948 to 527,265 in 1954; total sales volume increased from $48,015,000,000 to $63,468,570,000 during the same period, an increase of 32.1 percent.

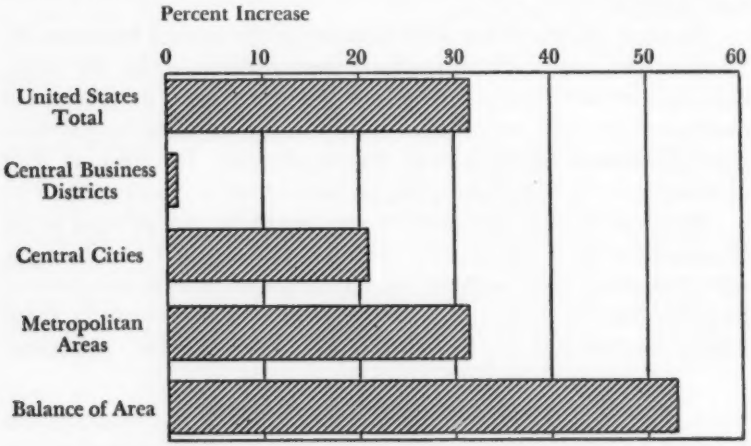
In the central cities the number of stores fell from 327,378 in 1948 to 306,507 in 1954, a decline of 6.4 percent. Sales volume in the central cities, however, climbed from $31,003,264,000 in 1948 to $37,431,404,000 in 1954, for a percentage increase of 20.7.

In that portion designated as the balance of the area, the number of stores increased 1.6 percent from 216,941 to 220,358; sales

volume, however, rose from $17,011,681,00 to $26,037,165,000, a gain of 53.1 percent.

How do these changes compare with changes in the total retailing picture for the whole country? Total retail sales in 1948 amounted to approximately 129 billion dollars. They climbed to approximately 170 billion dollars in 1954 for an increase of 32 percent. Figure II shows the changes that have occurred for the United States as a whole, the twenty-four large standard metropolitan areas, and the subdivisions of these twenty-four areas.

PERCENTAGE INCREASE IN RETAIL SALES VOLUME
For United States and 24 Metropolitan Areas and Component Parts, 1948–1954



SOURCE: *Adapted from United States Department of Commerce, Bureau of Census, 1954 Retail Trade: United States Summary and Selected Bulletins on the Central Business Districts.*

Figure 2

The pattern is clear as far as the position of the central business district is concerned. It is a losing position. The twenty-four central business districts show an increase in sales volume of one percent. This compares unfavorably with increases of 32 percent for all retailing, 21 percent for the central cities, 32 percent for the twenty-four standard metropolitan areas, and 53 percent for the balance of the area.

Table II

RETAIL TRADE IN SELECTED STANDARD METROPOLITAN AREAS AND COMPONENT PARTS 1948 and 1954

Metropolitan Area	Stores		Sales (000)		Percent of Total				Percent change 1948 to 1954	
					Stores		Sales			
	1948	1954	1948	1954	1948	1954	1948	1954	Stores	Sales
Total Metropolitan Areas for Twenty-four Cities	*544,319*	*527,265*	*$48,015,045*	*$63,468,570*	*100.0*	*100.0*	*100.0*	*100.0*	*—3.1*	*+32.2*
Central Business Districts	41,680	38,858	9,469,067	9,516,112	7.7	7.4	20.0	15.0	—6.8	+0.9
Cities	327,378	306,507	31,003,264	37,431,404	60.1	58.1	64.6	59.0	—6.4	+20.7
Balance of Areas	216,941	220,358	17,011,681	26,037,165	39.9	41.9	35.4	41.0	+1.6	+53.1
New York Metropolitan Area	*161,695*	*148,693*	*12,308,614*	*15,433,091*	*100.0*	*100.0*	*100.0*	*100.0*	—8.0	+25.4
Central Business District	10,554	10,801	2,083,058	2,185,107	6.5	7.3	16.9	14.2	+2.3	+4.9
New York	98,183	87,210	7,820,109	8,796,790	60.7	58.7	63.5	57.0	—11.2	+12.5
Balance of Area	63,512	61,483	4,488,505	6.636,301	39.3	41.3	36.5	43.0	—3.2	+47.9
Chicago Metropolitan Area	*59,401*	*54,632*	*4,398,944*	*6,898,919*	*100.0*	*100.0*	*100.0*	*100.0*	—8.5	+27.8
Central Business District	2,507	2,292	753,508	714,784	4.2	4.2	14.0	10.4	—8.5	—5.1
Chicago	41,493	35,918	3,798,125	4,444,333	69.9	65.8	70.3	64.4	—13.4	+17.0
Balance of Area	17,908	18,714	1,600,819	2,454,586	30.2	34.3	29.7	35.6	+4.5	+53.3
Los Angeles Metropolitan Area	*46,999*	*48,461*	*4,587,689*	*6,903,325*	*100.0*	*100.0*	*100.0*	*100.0*	+3.1	+50.5
Central Business District	1,972	1,610	451,009	421,003	4.2	3.3	9.8	6.1	—18.4	—6.7
Los Angeles	22,122	22,120	2,272,112	3,103,047	47.1	45.6	49.5	45.0	—0.1	+36.6
Balance of Area	24,877	26,341	2,315,577	3,800,278	52.9	54.4	50.5	55.0	+5.9	+64.1
Philadelphia Metropolitan Area	*42,410*	*41,033*	*3,109,188*	*4,060,514*	*100.0*	*100.0*	*100.0*	*100.0*	—3.2	+30.6
Central Business District	3,073	2,768	650,964	604,324	7.3	6.8	20.9	14.9	—9.9	—7.2
Philadelphia	26,103	23,819	1,926,594	2,260,856	61.6	58.1	62.0	55.7	—8.8	+17.3
Balance of Area	16,307	17,214	1,182,594	1,799,658	38.4	41.9	38.0	44.3	+5.6	+52.2
Detroit Metropolitan Area	*27,263*	*27,732*	*2,946,668*	*4,106,958*	*100.0*	*100.0*	*100.0*	*100.0*	+1.7	+39.4
Central Business District	1,382	1,318	456,005	405,465	5.1	4.8	15.1	9.9	—4.6	—11.1
Detroit	17,665	17,016	2,034,415	2,474,001	64.8	61.4	69.0	60.2	—3.4	+21.6
Balance of Area	9,598	10,716	912,253	1,632,957	35.2	38.6	31.0	39.8	+11.6	+79.0

Central Business District	1,382	1,318	456,005	405,465	5.1	4.8	15.1	9.9	−4.6	−11.1
Detroit	17,665	17,016	2,034,415	2,474,001	64.8	61.4	69.0	60.2	−3.4	+21.6
Balance of Area	9,598	10,716	912,253	1,632,957	35.2	38.6	31.0	39.8	+11.6	+79.0
Boston Metropolitan Area	*23,358*	*22,917*	*2,114,082*	*2,855,379*	*100.0*	*100.0*	*100.0*	*100.0*	−1.9	+35.1
Central Business District	1,754	1,698	422,850	434,376	7.5	7.4	20.0	15.2	−3.2	+2.7
Boston	9,414	8,720	1,008,408	1,236,160	40.3	38.1	47.7	43.3	−7.4	+22.6
Balance of Area	13,944	14,197	1,105,574	1,619,219	59.7	61.9	52.3	56.7	+1.8	+46.5
San Francisco Metropolitan Area	*24,125*	*25,366*	*2,300,684*	*2,958,649*	*100.0*	*100.0*	*100.0*	*100.0*	+5.2	+28.6
Central Business District	2,620	2,360	407,597	410,336	10.9	9.3	17.7	13.9	−9.9	+0.7
San Francisco	9,845	9,588	1,023,713	1,154,020	40.8	37.8	44.5	39.0	−2.6	+12.7
Balance of Area	14,280	15,778	1,276,971	1,804,629	59.2	62.2	55.5	61.0	+10.5	+41.3
Pittsburgh Metropolitan Area	*22,176*	*20,619*	*1,921,020*	*2,212,049*	*100.0*	*100.0*	*100.0*	*100.0*	−7.0	+15.1
Central Business District	815	809	362,358	304,167	3.7	3.9	18.9	13.7	−0.8	−16.1
Pittsburgh	7,156	6,640	846,783	872,725	32.3	32.2	44.1	39.5	−7.2	+3.1
Balance of Area	15,020	13,979	1,074,237	1,339,324	67.7	67.8	55.9	70.5	−6.9	+24.7
St. Louis Metropolitan Area	*18,791*	*17,948*	*1,521,471*	*2,016,650*	*100.0*	*100.0*	*100.0*	*100.0*	−4.4	+32.5
Central Business District	674	613	274,506	246,545	3.6	3.5	18.0	12.2	−9.0	−10.0
St. Louis	11,021	9,695	950,893	1,130,491	58.6	54.1	62.5	56.1	−12.0	+18.9
Balance of Area	7,770	8,253	570,578	886,159	41.4	45.9	37.5	43.9	+6.2	+55.3
Cleveland Metropolitan Area	*14,897*	*14,533*	*1,466,273*	*1,923,462*	*100.0*	*100.0*	*100.0*	*100.0*	−2.4	+31.2
Central Business District	1,112	999	357,576	377,417	7.5	6.9	24.4	19.6	−10.2	+5.5
Cleveland	11,209	10,231	1,131,194	1,330,593	75.2	70.4	77.1	69.2	−8.7	+17.6
Balance of Area	3,688	4,302	335,079	592,869	24.8	29.6	22.9	30.8	+16.6	+76.9
Washington Metropolitan Area	*9,883*	*10,494*	*1,459,570*	*1,981,956*	*100.0*	*100.0*	*100.0*	*100.0*	+6.2	+35.8
Central Business District	1,439	1,380	421,433	413,072	14.6	13.2	28.9	20.8	−4.1	−2.0
Washington	6,910	6,393	1,091,309	1,187,005	69.9	60.9	74.8	59.9	−7.5	+8.8
Balance of Area	2,973	4,101	368,261	794,951	30.1	39.1	25.2	40.1	+37.9	+115.9
Buffalo Metropolitan Area	*13,411*	*11,922*	*996,868*	*1,330,466*	*100.0*	*100.0*	*100.0*	*100.0*	−11.1	+33.5
Central Business District	1,581	1,309	210,426	208,731	11.8	11.0	20.2	15.9	−17.2	+3.6
Buffalo	7,869	6,758	644,506	769,272	58.7	56.7	64.7	57.8	+85.9	+19.4
Balance of Area	5,542	5,164	352,362	561,194	41.3	43.3	35.3	42.2	−6.8	+59.3
Cincinnati Metropolitan Area	*9,615*	*9,231*	*853,900*	*1,119,117*	*100.0*	*100.0*	*100.0*	*100.0*	−4.0	+31.1
Central Business District	1,054	898	245,553	265,568	11.0	9.7	23.7	23.7	−14.8	+8.2
Cincinnati	6,027	5,535	603,550	754,795	62.7	60.0	70.7	67.4	+25.1	+25.1
Balance of Area	3,588	3,696	250,350	364,322	37.3	40.0	29.3	32.6	+3.0	+45.5
Milwaukee Metropolitan Area	*9,519*	*9,787*	*903,991*	*1,144,581*	*100.0*	*100.0*	*100.0*	*100.0*	+2.8	+26.6
Central Business District	814	790	193,263	191,287	8.5	8.1	21.4	16.7	−2.9	−1.0
Milwaukee	7,575	8,055	772,478	931,027	79.6	82.3	85.5	81.3	+6.3	+20.5
Balance of Area	1,944	1,732	131,513	213,554	20.4	17.7	14.5	18.7	−10.9	+62.4

Central Business District	814	790	193,203	191,287	8.5	8.1	21.4	16.7	−2.9	−1.0
Milwaukee	7,575	8,055	772,478	931,027	79.6	82.3	85.5	81.3	+6.3	+20.5
Balance of Area	1,944	1,732	131,513	213,554	20.4	17.7	14.5	18.7	−10.9	+62.4
Houston Metropolitan Area	*7,451*	*8,584*	*803,857*	*1,194,837*	*100.0*	*100.0*	*100.0*	*100.0*	+15.2	+48.6
Central Business District	1,585	1,387	344,657	379,902	21.3	16.2	42.9	31.8	−12.5	+10.2
Houston	5,477	7,032	682,755	1,035,297	73.5	81.9	84.9	86.6	+28.4	+51.6
Balance of Area	1,974	1,552	121,102	159,540	26.5	18.1	15.1	13.4	−21.4	+31.7
Seattle Metropolitan Area	*7,576*	*7,750*	*713,448*	*947,974*	*100.0*	*100.0*	*100.0*	*100.0*	+2.3	+32.9
Central Business District	1,124	985	203,991	214,354	14.8	12.7	28.6	22.6	−12.4	+5.1
Seattle	5,554	6,026	574,429	768,081	73.3	77.8	80.5	81.0	+8.5	+33.7
Balance of Area	2,022	1,724	139,019	179,893	26.7	22.2	19.5	19.0	−14.7	+29.4
Portland Metropolitan Area	*7,094*	*7,585*	*726,905*	*874,446*	*100.0*	*100.0*	*100.0*	*100.0*	+6.9	+20.3
Central Business District	949	878	186,662	181,851	13.4	11.6	25.7	20.8	−7.5	−2.6
Portland	4,477	4,956	532,498	631,792	63.1	65.3	73.3	72.3	+10.7	+18.7
Balance of Area	2,617	2,629	194,407	242,654	36.9	34.7	26.7	27.7	+0.5	+24.8
New Orleans Metropolitan Area	*7,135*	*6,824*	*545,464*	*721,122*	*100.0*	*100.0*	*100.0*	*100.0*	−4.4	+32.2
Central Business District	1,116	1,058	234,314	257,272	15.6	15.5	43.0	35.7	−5.2	+9.8
New Orleans	6,190	5,766	499,791	626,172	86.8	84.5	91.6	86.8	−6.8	+25.3
Balance of Area	945	1,058	45,673	94,950	13.2	15.5	8.4	13.2	+12.0	+107.9
Atlanta Metropolitan Area	*5,409*	*5,980*	*604,833*	*881,086*	*100.0*	*100.0*	*100.0*	*100.0*	+34.1	+45.7
Central Business District	919	891	254,063	263,191	17.0	14.9	42.0	29.0	−3.0	+3.6
Atlanta	3,348	4,084	460,225	673,193	61.9	68.3	76.1	76.4	+22.0	+46.3
Balance of Area	2,061	1,896	144,608	207,893	38.1	31.7	23.9	23.6	−8.0	+43.8
Dallas Metropolitan Area	*5,694*	*6,819*	*648,665*	*1,030,850*	*100.0*	*100.0*	*100.0*	*100.0*	+19.8	+58.9
Central Business District	578	539	169,631	166,719	10.2	7.9	26.2	16.2	−6.7	−1.7
Dallas	4,506	5,562	572,123	894,838	79.1	81.6	88.2	86.8	+23.4	+56.4
Balance of Area	624	454	39,229	55,354	12.3	18.4	11.8	13.2	−2.6	+77.7
Louisville Metropolitan Area	*5,429*	*5,324*	*502,695*	*707,802*	*100.0*	*100.0*	*100.0*	*100.0*	−1.9	+40.8
Central Business District	1,181	1,026	193,979	233,060	21.8	19.3	38.6	32.9	−13.1	+15.0
Louisville	2,867	2,902	297,299	542,588	71.2	73.2	79.0	76.8	+0.9	+26.8

New Orleans Metropolitan Area	*7,135*	*6,824*	*545,464*	*721,122*	*100.0*	*100.0*	*100.0*	*100.0*	—4.4	+32.2
Central Business District	1,116	1,058	234,314	257,272	15.6	15.5	43.0	35.7	—5.2	+9.8
New Orleans	6,190	5,766	499,791	626,172	86.8	84.5	91.6	86.8	—6.8	+25.3
Balance of Area	945	1,058	45,673	94,950	13.2	15.5	8.4	13.2	+12.0	+107.9
Atlanta Metropolitan Area	*5,409*	*5,980*	*604,833*	*881,086*	*100.0*	*100.0*	*100.0*	*100.0*	+34.1	+45.7
Central Business District	919	891	254,063	263,191	17.0	14.9	42.0	29.0	—3.0	+3.6
Atlanta	3,348	4,084	460,225	673,193	61.9	68.3	76.1	76.4	+22.0	+46.3
Balance of Area	2,061	1,896	144,608	207,893	38.1	31.7	23.9	23.6	—8.0	+43.8
Dallas Metropolitan Area	*5,694*	*6,819*	*648,665*	*1,030,850*	*100.0*	*100.0*	*100.0*	*100.0*	+19.8	+58.9
Central Business District	578	539	169,631	166,719	10.2	7.9	26.2	16.2	—6.7	—1.7
Dallas	4,506	5,562	572,123	894,838	79.1	81.6	88.2	86.8	+23.4	+56.4
Balance of Area	624	454	39,229	55,354	12.3	18.4	11.8	13.2	—2.6	+77.7
Louisville Metropolitan Area	*5,429*	*5,324*	*502,695*	*707,802*	*100.0*	*100.0*	*100.0*	*100.0*	—1.9	+40.8
Central Business District	1,181	1,026	193,979	233,060	21.8	19.3	38.6	32.9	—13.1	+15.0
Louisville	3,867	3,902	397,309	543,588	71.2	73.3	79.0	76.8	+0.9	+36.8
Balance of Area	1,562	1,422	105,386	164,214	28.8	26.7	21.0	23.2	—0.9	+55.8
Denver Metropolitan Area	*5,177*	*5,700*	*554,940*	*847,353*	*100.0*	*100.0*	*100.0*	*100.0*	+10.1	+52.7
Central Business District	1,009	845	177,517	183,462	19.5	14.8	31.9	21.7	—16.6	+3.3
Denver	4,040	4,212	472,645	659,036	78.0	73.9	85.2	77.8	+4.3	+39.4
Balance of Area	1,137	1,488	82,295	188,317	22.0	26.1	14.8	22.2	+30.6	+128.8
Birmingham Metropolitan Area	*4,742*	*4,500*	*432,994*	*523,714*	*100.0*	*100.0*	*100.0*	*100.0*	—5.1	+21.0
Central Business District	687	627	157,931	161,034	14.5	14.0	36.5	30.7	+0.4	+2.0
Birmingham	2,882	2,892	334,247	415,377	60.8	64.3	77.2	79.3	+0.4	+24.3
Balance of Area	359	258	14,668	25,697	7.8	35.7	22.8	20.7	—13.6	+9.7
Indianapolis Metropolitan Area	*5,069*	*4,831*	*592,282*	*794,270*	*100.0*	*100.0*	*100.0*	*100.0*	—4.7	+34.1
Central Business District	1,181	977	265,216	293,085	23.3	20.2	44.8	36.9	—17.3	+10.5
Indianapolis	4,445	4,377	553,053	738,916	87.7	90.6	93.4	93.0	—1.5	+33.5
Balance of Area	624	454	39,229	55,354	12.3	9.4	6.6	7.0	—27.2	+41.1

Not all central business districts changed in the same direction or by the same amount. The range was from a 16.1 per cent decline in Pittsburg to a 10.5 percent gain in Indianapolis. Even the central business district showing the largest gain – Indianapolis – falls short of the average improvement for retailing nationally, for the standard metropolitan area, the central city, or the balance of the area.

The dollar-figure comparisons over a period of time, of course, have shortcomings. Everyone is aware that a given quantity of money does not always buy the same "physical bundle" of merchandise. Whether it buys more or less with the passage of time depends on what happens to prices with the passage of time. For the complex phenomena we are considering here, it would be insufficient to correct for price changes (which would give a better picture) by using a deflator such as the consumer price index. Developing a method of correcting for price changes is beyond the scope of this discussion.

It should be mentioned, however, that from 1948 to 1954 consumer prices were rising. According to the consumer price index of the United States Department of Labor, when the 1947–49 period is used as a base, the increase by 1954 was approximately 15 percent. The increase for wearing apparel was something less than five percent; for other items in the index it was obviously more. Inasmuch as approximately half of the sales in the central business district fall into the apparel category, it may be argued that the picture for this segment of the standard metropolitan areas is not as bad as the figures suggest.

While this is true, the slight difference involved should provide little cause for comfort for those who have an interest in the welfare of downtown. Even if we assumed a five percent increase in the price of items sold in the central business districts from 1948 to 1954 (and this would be a conservative estimate), with less than one percent increase in dollar volume of sales, the inference is clear: a smaller physical volume of merchandise was sold in central business districts in 1954 than in 1948.[3]

This fact is in contrast with the situation in the immediate postwar years when, even though the position of the central business

3. A rough estimate of the change in physical volume from 1948 to 1954 for the United States as a whole would be a 20 percent increase.

districts was threatened, the dollar sales volume increased sufficiently to produce increases in physical volume. The revolution at that time may have been somewhat painless for central business district retailers. Recent changes have been painful enough to drive several downtown retailers of substantial tenure out of business and at the same time place others in the "little or no progress" category.[4]

Factors in Changing Retail Volumes

What has produced these changes of varying magnitude in the different parts of standard metropolitan areas? Why have some parts enjoyed substantial gains, while other parts have showed modest gains or none at all? The answers to these questions are not simple. Moreover, they are imbedded in the general proposition that retailing exists to serve society and that fundamental changes in the makeup of a society will force fundamental changes in the character of existing retailing capacity.

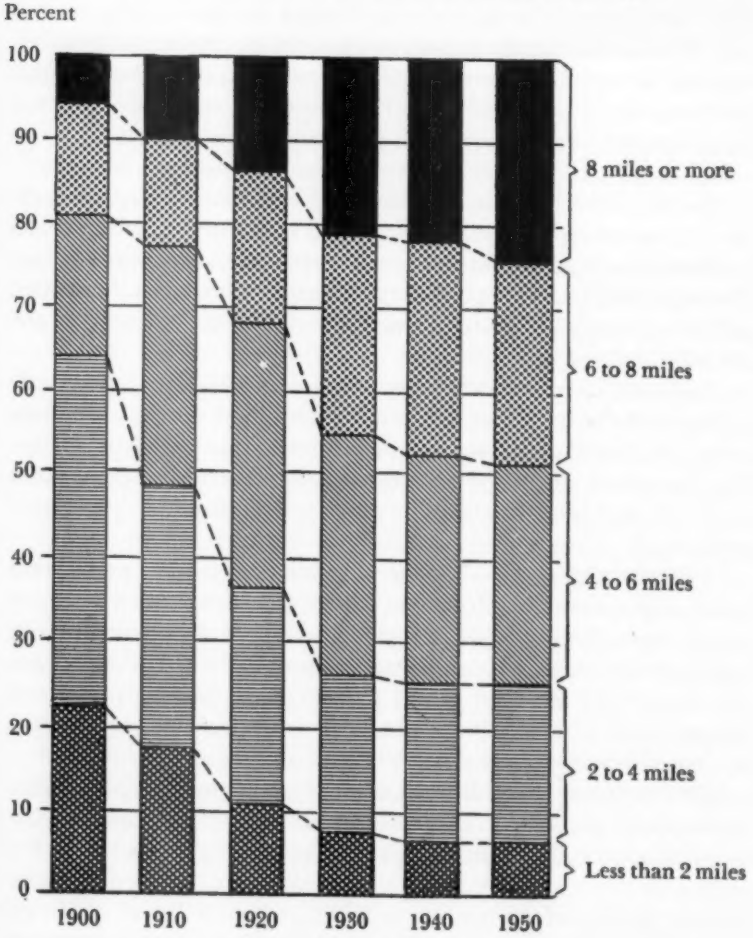
The major change on the retailing side of the equation centers around the geographic location of retail trade transactions within the standard metropolitan areas. The factors producing this change are largely related to the changes in (1) size of the population, (2) purchasing power of the population, and (3) mobility of the population. What has happened to each of these factors in recent years and what is the outlook for the future? How will the anticipated changes affect the location of retail trade transactions in the future?

The population increased 14.5 percent during the 1940 decade; between 1950 to 1955, another 7.9 percent was added. Estimates for the future vary, but even the most conservative projections of the Bureau of the Census estimate a population in excess of 200 millions by 1975.

This increase in population – like those of the past – will not spread itself equally throughout the country. About 80 percent of the growth between 1940 and 1950 took place within the 168 metropolitan areas of the nation. The population in metropolitan areas increased from 83.8 millions to 95.3 millions from 1950 to

4. The Federal Reserve Bank of St. Louis estimates that the physical volume of department stores in downtown St. Louis has dropped 25 percent in the last ten years.

DISTRIBUTION OF RESIDENT POPULATION
IN THE CITY OF CHICAGO
By Distance Zones form the Center of the City, 1900–1950



SOURCE: *Growth and Redistribution of the Resident Population in the Chicago Standard Metropolitan Area, 1954: Chicago Community Inventory, University of Chicago.*

Figure 3

1955. This represented almost all of the growth in population for the United States during these five years.

Moreover, the metropolitan area comprises several parts and the increases in population, like the increases in retail sales volume, have been greatest in that portion beyond the limits of the central city. Unfortunately, the population figures for the central business districts are not easily available; consequently, population changes in this sector of the city cannot be reported as was done for retail sales. Instead, some changes in population of the central city in comparison with the satellite regions can be reviewed.

In his recent book on *Deconcentration of the Population*, Amos H. Hawley shows how the population in our largest metropolitan areas has been moving away from the center of the city. (2) Over a period of roughly fifty years the percentage of people who live in the central city of a metropolitan area in contrast with the remainder of the areas has continued to drop.

In 1910, 77 percent of the people was classified as central city residents. By 1950, this figure had changed to 58 percent. Changes in population in metropolitan areas from 1950 to 1955 indicate that this trend continues. Increases in the central city population were 3.8 percent while outside the central city they were 27.8 percent.

Figure 3 shows the changes in percentage of the population living a given distance from the center of Chicago between 1900 and in 1950. For example, in 1900, 5.8 percent of the people lived eight or more miles from the center of the city. By 1950 the increase was more than four-fold – 24.3 percent. Less than 25 percent of the people lived within four miles of the center of the city in 1950; in 1900 almost 65 percent resided within this distance.

One estimate of the Bureau of the Census projects population increases for the next twenty years as follows: 38.3 million in the suburbs, 16.8 million outside the major metropolitan areas, 8.2 million in the central cities.[5] In the period of this projection, more than 60 percent of the total population increase will find residence in the suburban areas, in keeping with the trend that has gained impetus for some time. At the moment, it seems safe to say that

5. The Bureau of Census makes several projections which differ according to varying sets of assumptions.

this is the only direction the population can go if the people are to find satisfactory living space.

Effect of Dispersal on Consumer

When population is dispersed a greater distance from the city, what effect does this have on the shopping behavior of the consumer? The most obvious effect is to increase the distance and time between the customer and the major market place. As the distance is increased, the friction or difficulty of shopping in the major market increases. The result is often a search for alternative places where wants may be satisfied. Alert shopping center promoters and retailers are providing places to shop so that consumers' patience is taxed very little in carrying out this searching process.(3)

The market is composed of people who are able and willing to buy; it has both quantitative and qualitative dimensions. For this reason, interest is focused on where the population is situated, and also in the ability of that population to buy. From 1948 to 1954, the disposable income of the United States grew by approximately 35 percent. Disposable income is the key factor in retail sales, for it is income after taxes.

Some people, therefore, represent better markets than others because of their greater ability to buy. A population of 50,000 people living near the center of one of our great metropolitan areas quite likely would be less potent, as far as its consumption expenditures are concerned, than the same number of people in a suburban area of a large city.

The available evidence indicates that not only does a greater percentage of people live a greater distance from the center of cities, but also that their per capita purchasing power is higher than that of residents within the city. The following statement concerning the city of Chicago is equally applicable to many of our other large cities:

"The people that migrated to Chicago settled mainly in the blighted and near-blighted sections of the city. The population that left the city for the suburbs have on the average a higher income, more education, and a greater percentage is employed in white collar positions than the population of Chicago. In contrast, a large percentage of the population moving to Chicago falls into

the lower income brackets, having less education, and employed in less skilled positions than the established residents of the city." (4)

The same Chicago study showed that disposable income increased by 12 percent in the city of Chicago from 1948 to 1954. At the same time, the increase in the Chicago metropolitan area outside of the city of Chicago but within Cook County was 50 percent, and in that portion of the Chicago metropolitan area outside of Cook County, the increase in disposable income from 1948 to 1954 was 72 percent. Although many studies support the thesis that incomes are higher in the suburbs than in the central city, one needs only to ride through a typical suburban area and observe the level of living to realize that consumption in this sector is on a higher level than that closer to the city's center.

Since disposable income is such an important factor in retail sales, what is the outlook for the future? What do the experts predict? For this year many of the experts think we shall attain a level of $300 billion in disposable income. The outlook for 1975 is in excess of $500 billion. This 67 percent increase over the anticipated disposable income for this year will require considerably more retailing capacity.

Where will this capaicty be established? If retailers continue to watch the behavior of consumers and anticipate their shopping needs with care, they also will continue to follow the established trends. If such is the case, the capacity will be established in the peripheral areas of our largest cities. By doing this, retailers will be following the long-respected principle of locating near growing populations who also have ability to buy.

Mobility and Accessibility

The question of willingness to buy in retail stores at one location rather than another – specifically, downtown versus an area outside of downtown – is related to the mobility of our population. How convenient is it to get to one area compared to another? Never before has the population been more mobile. Privately owned automobiles now number in excess of fifty million. Approximately three-fourths of American families have at least one car, affording them a flexibility in their movements heretofore impossible.

This flexibility has been a very important factor in opening up wider areas of choice for place of residence; such locations are no longer restricted by the nearness of a public transportation system. Greater range also is available in choice of employment, and workers are traveling greater distances as a result of the availability of transportation in the private automobile.(5) Finally, this mobility made possible by the private automobile has created new shopping opportunities, especially at the newly constructed shopping centers.

It is doubtful, however, whether the private automobile has contributed to the welfare of the downtown retailers since 1948. On the contrary, traffic and parking conditions in the central business districts have been a deterrent to what has become a preferred mode of shopping for so many – the private automobile. It may well be said of our tempo of living today that a shopper and his car are seldom parted – unless the shopping takes place downtown.

Obviously, some people are unwilling to forego the convenience of their private car for shopping but are also unwilling to face the costs of downtown driving. These costs are of two types, the first being the actual dollar cost of providing a space in which to park the car while it is downtown. Especially in the largest cities, this cost is looked upon by some as an "admission charge" not required in outlying shopping areas.

The other costs are non-monetary. They are associated with the difficulties of driving in a congested area. The question can be seriously raised as to whether or not the private automobile provides for greater mobility in all directions, or whether it loses this attribute when employed in the central business district. The periods of the day when automobiles are least mobile and flexible are the so-called "rush hours" which engender traffic conditions not at all conducive to "rushing" the automobile.

What is the alternative to using the private automobile for shopping downtown ? The most obvious answer is the public transportation system. For many shoppers this is the only method they would consider. For others it is the only method they can consider, mainly because they are non-owners of automobiles, they do not drive, or they do not drive downtown.

The number of people employed has continued to increase since

1940; but, except for the war years of gasoline rationing and the scarcity of automobiles, transit riders have decreased in number. Since 1948, revenues for metropolitan transportation systems have remained close to $1.5 billion, but increasing costs have resulted in net operating losses for many. Numerous efforts have been made to bring about improved metropolitan transportation facilities and services. Such improvements require money in sums that to date have not been forthcoming in many of our largest cities where the problem is most acute.

What about the future of the public transportation systems so important to the welfare of the central business district? The question is summed up by Wilfred Owen as follows:

"Hope of meeting the transportation needs of the urban area through greater reliance on public transportation has been dimmed as the fortunes of the industry have continued to decline. The cycle of traffic losses, rising costs, higher fares, less frequent service, and further loss of business has persisted. The same growth factors that created the overwhelming demand for automotive transportation have caused a sharp reduction in the patronage of mass transportation facilities. Prosperity for the motor age has meant depression for transit." (6)

TABLE III

PERCENTAGE DISTRIBUTION OF CONSUMER EXPENDITURES FOR TRANSPORTATION

Type of Transportation	*1909*	*1919*	*1929*	*1940*	*1950*	*1954*
ALL TRANSPORTATION	100.0	100.0	100.0	100.0	100.0	100.0
Private	47.4	71.5	78.3	82.2	86.9	87.9
Local public carrier	33.3	16.8	14.7	12.7	8.9	8.0
Intercity public carrier	19.3	11.7	7.0	5.1	4.2	4.1

SOURCE: *J. Frederick Dewhurst and Associates*, America's Needs and Resources, *Twentieth Century Fund* (1955), *p.* 971; *U. S. Department of Commerce*, National Income, *A Supplement to the Survey of Current Businsss* (1954), *pp.* 206–207; Survey of Current Business (*July* 1955), *p.* 19.

Table III shows this simultaneous prosperity and depression in private and public transportation on the basis of consumer expenditures.

During the period from 1941 to 1954 – and expressed in 1947 dollars – expenditures for local public carriers increased from $1.6 billion to $1.8 billion; private automobile expenditures rose from $11.2 billion to $20.1 billion during the same period.(7)

In contrast with the presently dim outlook for improvement in metropolitan transportation systems, is the prediction for a greater

incidence of automobile ownership and more multiple-car families. Today's private automobile population of more than fifty million vehicles will probably reach one hundred million by 1975.

How much new space will be provided for this enlarged inventory of cars both when they are in motion and at rest? Unless it is substantial, problems of congestion and parking will become even more acute than they are today. This result may hasten the arrival of the day when, according to Wroe Alderson, "All surface vehicles will be barred from the downtown area."(8)

It appears that the recent trends in population, purchasing power, and mobility and their interactions on each other have not been as favorable to expansion of retail trade in the central business districts as they have been to other parts of the largest standard metropolitan areas. It further appears that trends of the past will continue into the future. Will this mean additional deterioration of the status of retailing in the downtown area ? Or will events unfold in such a way as to develop a new pattern, one more favorable to the central business districts ? These are questions only time will answer. If the parties interested in the welfare of downtown develop widespread programs for action – and then act – the chances of answers favorable to downtown will be enhanced materially.

Summary

The proportion of retail sales transacted in the central business districts of twenty-four metropolitan areas declined by about 25 percent from 1948 to 1954. The total dollar volume in central business districts increased less than one percent while retail sales nationally increased by 32 percent. Prices in 1954 were approximately 15 percent higher than in 1948. The physical volume of merchandise sold in downtown during this period decreased. Downtown lost position in retail trade from 1948 to 1954.

Changes in number, purchasing power, and mobility of the population were important in bringing about the change in the status of the central business district in retail trade. More population with greater per capita purchasing power stimulated the development of new retailing capacity. The growing incidence of automobile ownership – which made it possible for millions to move

to outlying areas – encouraged the building of retailing capacity where customers could shop by car.

The place where shopping by car is apparently less rather than more convenient is the central business district. But the inadequacies of so many public transportation systems, as an alternative method of travel for shopping, have influenced customers to look for new places to shop and to continue using their private vehicles for this activity. The outlook for the future for population, purchasing power, and mobility is for a continuation of recent trends. These trends have not been favorable to downtown.

NOTES

1. *Census of Business*: 1948, Central Business District Bulletins, Washington, D. C., Numbers 1, 2, 8, 12, 21, 22, 26, 27, 29, 31, 32, 33, 34, 37, 38, 40, 42, 43, 44, 45, 46, 48, 49, and 50.

2. Amos H. Hawley, *The Changing Scope of Metropolitan America*: *Deconcentration Since* 1920. The Free Press, Glencoe, Illinois, 1956.

3. For a detailed study on the location of shopping centers see Eugene J. Kelley, *Shopping Centers*: *Locating Controlled Shopping Centers*. The Eno Foundation for Highway Traffic Control, Saugatuck, Connecticut, 1956.

4. *Chicago's Metropolitan Growth*: *Patterns Problems Prospects*. Business Executives Research Council of Greater Chicago, p. 16.

5. W. C. McKain, Jr. and N. L. Whetten, *Occupational and Industrial Diversity in Rural Connecticut*. Storrs Agricultural Experiment Station Bulletin No. 263. 1949.

6. Wilfred Owen, *The Metropolitan Transportation Problem*. The Brookings Institution, Washington, D. C., 1956, p. 67.

7. Ibid, p. 72.

8. Wroe Alderson, *Here's How the Stores Will Face It*. Nation's Business, Vol. 43, November 1956, p. 88.

Road Accidents, Other Accidents, And Our Laws about Them

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THIS article was originally prompted by a report of a conference convened by the Pedestrian's Association in 1954. At this conference some eminent lawyers discussed the commonly held view that a large part of the solution to the problem of road safety – if not the solution itself – is the enforcement of the existing criminal law,[1] probably with even more severe penalties. This is a generally held opinion, and we are always told that the Three E's – Education, Engineering, and Enforcement – will solve the problem. This discussion examines the enforcement aspect of the solution, from the standpoint of a non-lawyer. . . .

We may begin by stating three problems, all expressed for England and Wales.

A. During the years 1941 to 1955, inclusive, 63,077 people were killed in road accidents involving motor vehicles, a yearly average of 4,205. During the same period 5,770 people were killed in road accidents in which motor vehicles were not involved, a yearly average of 385.

[1] In the rest of the Paper the word Law is used to mean the Criminal Law, unless otherwise stated.

B. During the same years, 174,082 people were killed in other types of accident, a yearly average of 11,606. This figure does not include homicide, suicide – which has a yearly average of 4,195 – or operations of war.

C. In 1955, there were 608,640 offenses committed or alleged to have been committed, against the traffic law by 519,102 people. Of these, 15,997 charges were either withdrawn or dismissed, and in the rest of the cases the offender was either convicted or warned. All these cases concerned motor vehicles. This number has been steadily rising.

Which of these is the most important problem? If most people were asked this question, without being given any figures, they would answer Problem A – the road accidents – because it has received an enormous publicity for many years. But if we look at the figures, Problem B would appear to be even more important, since so many more accidents occur in other ways, yet this problem gets little publicity, and very little public attention.

Can we be sure that, on the broader view, Problem C is not by far the most important? It means that one person in every eighty-six of the population – or about one motorist in every ten – is convicted or warned for an offense against the traffic law every year. Moreover, traffic offenses are 55 percent of all indictable offenses. It is also a matter of everyday observation that the law is broken far more often, without detection. Counts show that in some places about half the motors exceed the speed limit, and that a substantial proportion disregard Halt signs. But the real heart of the problem is that *these people are just that section of the population which would ordinarily be expected to be the most law-abiding.*

Now it does not appear that one in ten professional or business men, or lorry drivers commit annually some offense against the rest of the law. Why, then, do they treat the traffic law with such contempt? It surely cannot be from some innate criminal tendency which only comes out at the wheel of a motor. We must therefore consider whether the possibility might exist that the traffic law shows some defect, or defects, which make it worthy of contempt. If it does we are faced with a serious social problem, because this contempt for one section of the law will eventually lead to general contempt for all law, with calamitous results.

An early, and good, definition of law is that of St. Thomas Aquinas (1225–1274) which is, in Coplestone's paraphrase, "A measure or rule of human acts, a measure or rule conceived by reason and promulgated with a view to the common good." Words specially important in this definition are surely "reason" and the "common good." It is implied that a law must be based on solid facts, carefully thought out, and not on mere hunch, or on public clamor, or on spurious statistics. The common good implies that the law should be for the good of the community as a whole, and not to benefit one section of the community at the expense of another; and still more important that, it should not persecute one section.

General Principles Behind Law

Aquinas goes on to define an unjust law as one that imposes burdens on citizens for other motives than the common good, or one in which burdens "are imposed in an unfair and disproportionate manner." He says that such laws are not binding in conscience and even, in extreme cases, that they should not be obeyed. He calls them "acts of violence."

As an instance of this line of thought, let us consider the 30 m.p.h. speed limit. Many people abuse those who exceed the limit, and look upon them as criminals, advocating more and more severe penalties for infringement, and methods of catching culprits which savor very much of the police state. But the first question is whether the legislature was right in passing the law. If it was not, then the law is an unjust burden, and its enforcement may even be an act of violence. . . .

Before considering whether our traffic law complies with these principles, however, a digression must be made to consider the penalty of suspension of license. This penalty was inflicted on 18,878 people in 1955, though this was not nearly often enough to satisfy a very vocal body of opinion, including one or two eminent members of the legal profession.

At first sight, suspension of the driving license seems an admirable penalty. In the words of an eminent correspondent to *The Times*, (9) "The principle to be enforced should be, if a driver cannot drive safely, he should not be allowed to drive at all." Stated

thus, it seems an excellent principle, but it is an over-simplification. We must always consider the effect of a penalty on its victim.

It is hard to resist the conclusion that many who talk like this are still thinking in terms of, say, 1907 instead of 1957. In the former year, the motor was the plaything of a few rich men – the chauffeurs did not count in those days – to whom nothing more than inconvenience would result if they lost their license. Nowadays, however, the number of people who drive purely for pleasure must be very small indeed. The great majority use their motors for business or professions, or drive as an occupation in itself. To such people the loss of license is a serious matter. To some it would mean loss of livelihood, to many others the use of some form of alternative transport at great inconvenience and possibly loss of working time, or the hiring of a driver at great expense. . . .

The Traffic Law and Reason

Is the traffic law a "rule or measure conceived by reason"? It would be very hard to argue that it is. It was based on law passed with the deliberate intent of driving the mechanically propelled vehicle off the roads, and *wholly successful to that end.* Few people realize that steam vehicles were first made for road use, before the railways, and that they were killed by repressive legislation, dictated by prejudice. . . .

Many of our present rules are not based on any study, or on any knowledge of whether they are basically sound or not. In many cases, modifications have had to be made as a result of experience. Examples are the first pedestrian regulation, the definition of the words "in charge of a car," the automatic suspension of license in insurance offenses, and so on. Yet these were not modified until harm had been done to the prestige of the courts, and grave hardship inflicted on many people.

Consider the regulation against which nearly one sixth of all offenses were committed, the 30 m.p.h. speed limit. Can we say that this was properly thought out before it was passed? Surely not. . . . True, some slight evidence has been found that limits reduce accidents, but the evidence is weak. On the other hand some strong evidence to the contrary has been found.

Whatever the value of the limit, the "street lighting" criterion has led to gross abuse of the power to impose the limit, in that parish or urban councils have been able to obtain a limit by putting up some very sketchy – and possibly dangerous – form of street lighting when refused limits by higher authority. In travel about the country one often sees roads on which a speed of more than 30 m.p.h. could not be said to be dangerous by any stretch of the imagination.

The social danger of these cases is that most prosecutions for breach of the limit take place on these stretches. This inevitably tends to bring the whole limit, and indeed the law itself, into contempt. Indeed, with our present system of enforcement, these are the only places in which it is possible to enforce the limit, and the mere act of enforcement is an admission that the limit is unreasonable. . . .

It is of interest to note that in certain parts of the United States, *slow drivers* are prosecuted – under the term "slow pokes"– on the grounds that they are acting without consideration for others, and that they help to cause accidents. It is possible that our law is compelling some drivers to drive without consideration for others.

Another regulation which shows lack of real thought is the "Halt" sign. For many years the author took the easy and conventional view that it was a good sign. It seems obvious that if all drivers halted when entering a main road, accidents would be reduced; he forgot that the obvious is very often not true. In the report of an inquest on the victim of an accident in Dorset, the driver on the main road said, "I knew there was a Halt sign, so I carried on." If the driver on the main road is local, and knows that there is a Halt sign on the side road, he likely to carry on, relying on the driver on the side road to stop. If the latter does not, then the accident is likely to be more severe than if the sign were absent. It may not always be the fault of the side-road driver if he does not stop. A commercial vehicle parked close to the Halt sign may hide it from strangers. . . . The possibility exists, then, that the Halt sign may be as much a danger as a safety precaution. It is not intended to imply that the Speed Limit and Halt sign are wrong, but to say that their basis of reasoning is weak.

Another matter taken for granted is the deterrent effect of pen-

alties. . . . A penalty can only be a deterrent if the offense penalized is a wilful and deliberate act. If, on the other hand, the act is wholly or partly not wilful, the deterrent effect will be absent, or less effective. Error of judgment is largely, if not wholly, an involuntary act, and there is much evidence of a large element of error of judgment in much of the driving which leads to accidents. If this is true, then the deterrent effect of penalties becomes doubtful.

One of the few things we know about this very complicated subject is that road improvements do stop accidents. The evidence is overwhelming, and comes from all parts of the world. Some of the improvements which have stopped accidents have been almost trivial – changes in the position of traffic islands or in lighting. Slight changes in layout or surface have produced, or stopped, accidents.

In Dorset, the machine surfacing of a stretch of road suddenly produced a crop of accidents – fortunately minor ones – at a near-by bend. On investigation, it was found that the super-elevation of the bend was wrongly designed, and one five-ton load of surfacing material stopped the accidents completely. The conclusion is irresistible that accidents in such places are wholly due to error of judgment caused by something deceptive in the layout, and that accidents have been stopped by its removal.

If a driver who has been deceived by the layout is punished, the penalty is clearly not a deterrent. By the very fact that a court found the accident to be the driver's fault, attention has been diverted from the real cause of the accident, and nothing may have been done to remove the cause of deceit. In this aspect, then, the law, far from being a deterrent, may be actively harmful in helping to cause more accidents. . . .

It is often said that the deterrent would be effective if the law were strongly and universally applied. It is clear that the deterrent could, even in this case, only be effective if the acts are wilful, and not errors of judgment. It is obviously impossible to make people's judgment sound by imposing penalties for its failure. But the universal application of the present law might have three disastrous results.

The first is that such an enormous number of police would be needed that we should be well on the way to the police state. . . . But we certainly cannot be certain that this institution would stop accidents; we cannot be certain that it might not even increase

them. We could be sure that the cost of the extra police, if applied to road improvements, would reduce accidents.

The next possibility is that if licenses were suspended on any large scale, as so many demand, the national economy would be severely injured, since that economy is so dependent on the motor transport. This effect would probably take place before the deterrent effect would operate. It is also possible that the widespread feeling of grievance would largely nullify the deterrent effect.

Finally, if the law is inherently unjust – as it very possibly may be – then its rigid enforcement would poison the whole of national life. Are we justified in enforcing severe and possibly unjust penalties on the offchance that it might do good?

Any penalty loses its effect if too often repeated, or if it is inflicted without real reason. Men develop a fatalistic attitude towards it, and look upon its infliction as bad luck. . . .

The Common Good

A large part of the deterrent effect of penalties consists in the social stigma attached to them; that the criminal feels himself to be disgraced, and is looked upon as such by his associates. Sixty years or so ago a professional man would have been virtually ruined by having to appear in court and be found guilty of some crime. This certainly does not happen now, and there is little or no disgrace attached to having been convicted under the traffic law. This is, in itself, some condemnation of the law, and means that much of the deterrent is lost, and that much social harm has been done.

On the deterrent aspect, one final question may be asked. If real confidence is felt in the deterrent effect of penalties, why is little or no attempt made to stop the much larger number of accidents – well over twice the number – that occur in other parts of the national life, or on the road in the absence of a motor vehicle? In the latter case some attempt has now been made in the new Act, but the penalties are nominal compared with those inflicted on motorists, and, in particular, there is no means of preventing a dangerous cyclist from further riding, and from further accidents.

An unjust law is one that "imposes burdens in an unjust or disproportionate manner" as Aquinas puts it, or if it "requires one man

to do or omit things which are not expected from all . . ." as Hayek puts it. There can be no possible dispute with the statement that the common good requires the reduction of accidents, but we are fully entitled to enquire whether, in the name of doing this, an unjust or disproportionate burden may not be laid on the motorist. It may even be that the attempt to reduce accidents is made the excuse for laying this burden on him. . . .

Cases of cyclists injuring or killing people have occurred without prosecution, as also killing by careless handling of kettles of boiling water, and so on. It is hard to argue that this is anything but disproportionate. Either the law is excessively severe on the motorist, or excessively lenient on others. The new recklessness clause in the new act makes this difference become out of all proportion, in that a motorist may now get five years imprisonment for what is not a crime at all in others.

Another instance in which the law bears unevenly on the motorist is the insurance law. It seems at first sight admirable that the motorist should insure so that his victims should be sure of getting compensation. But the law begs the question, because it seems to be based on the questionable assumption that the motorist is always wholly responsible for accidents. He himself is not given any corresponding protection, and if he is injured by the action of any third party he has only the remedy of the civil law, the recourse to which is still open to his victims. . . .

The New Approach

The suggestion which is now going to be made will seem startling and revolutionary, but is is something which will have to be done sooner or later, and justice demands that it should be as soon as possible. It is that we should start *trusting the motorist* and relax much of the present severe law, especially reserving the severe penalty of suspension of licence for really wilful cases of dangerous driving. After all, we do trust the motorist in other walks of life. He runs our industry, he cures our illnesses, he does our business for us – he even maintains our roads! – and we trust him implicitly. Why, then, should we treat him as a criminal the moment he gets to the wheel of a car?

This idea will seem horrifying to those who form what one may term the "lambast the motorist" school, and the author does not expect it to find acceptance by them. To them he can only repeat Cromwell's plea to the ministers of the Kirk "I beseech you in the bowels of Christ think it possible you may be mistaken!"

In the United States they have made a start. In some states they argue that 90 percent or so, at least, of motorists are reasonable, decent, human beings, so, if a speed limit is mooted, they time the traffic, and make the limit that speed which was not being exceeded by 85 percent of motorists, *even if this means raising the limit.* This is known as the eighty-five percentile limit. It is based on the assumption that if 85 percent of motorists think that speed to be safe, then it is safe and reasonable. They then go on to argue that the remaining 15 percent will realise that the limit is reasonable, and reduce their speed accordingly. This has produced results. The traffic engineer to the State of Nebraska writes "Our records indicate that the posting of higher speed limits has not resulted in increased traffic accidents, but actually in a marked decrease." Surprisingly enough, the decrease is most marked in fatal accidents. This may possibly be due to the more realistic limit producing a reduction in the highest speeds.

This may be the clue. Some such process as this introduces the element of reason into the law, and also reduces the number of unjust and unreasonable prosecutions, increasing respect for the law as a corollary. The motorist then finds it "binding in conscience" as Aquinas puts it, or, in the words of Thomas More in Utopia, the law "puts him in remembrance of his duty." It was said recently, in an article, which ought to be much better known, by the Executive Director of the Indiana Traffic Safety Foundation "The answer lies in the hearts of men." We may begin by summing it up in the word discipline.

But there are two kinds of discipline. One is the rigid type, typified by the word Prussian but not unknown in some modern "progressive" countries. This is rigid and unyielding, imposed upon men by the fear of severe punishment. This type has never succeeded for long, and is by no means conspicuously successful in the progressive countries. The other type is the voluntary discipline of free men, self-imposed by a realisation of the need for the discipline,

and enforced with the irreducible minimum of penalties for the few who are unable to impose it on themselves. The former is the type the law is trying to impose at present, and the outcry for more and more severe penalties is an admission of its failure. Surely it must be realised that this kind of discipline is the last to which most of the men who constitute the motoring public are likely to submit. Educated men do not stand for this sort of thing for long, and it is wholly alien to the traditions of our country.

But it must also be remembered that, to prevent accidents on the road, *all* road users – the word *all* cannot be emphasised too much – most observe discipline. It is part of the jargon which is dear to the hearts of so many of the propagandists on the subject to say that "the motorist is in charge of the lethal weapon." but this is a very dangerous half-truth. First of all, the motor is not a lethal weapon, it is a means of transport. If we call it a lethal weapon, then we must call almost everything human beings use by the same term, and we are then entitled to ask why the law takes little or no care to prevent the much larger number of accidental deaths inflicted with other lethal weapons.

Secondly, even if the statement that the motor is a lethal weapon is true, the main statement is still not true. In the words of Viscount Simonds in a recent judgment in the House of Lords "The driver is not the only man in charge of an engine which, if carelessly used, might endanger and injure third parties." In one of the cases previously mentioned, the cyclist did not kill directly, his conduct was such as to make a motorist kill another road user, and the coroner's jury and a civil court, both decided that the motorist was entirely free from blame. The essential fact to remember is that other road users have partial control over the "lethal weapon," but have little or no legal responsibility for this control.

We must first ask ourselves whether it is, in general principle, a crime to injure or kill another person, or damage his property, by error of judgment, or carelessness, or negligence, or to cause some other person to do so. If we decide that it is, then all who do so should be punished, not only the motorist as at present. If we decide that it is not, then no one should be punished, *not even the motorist.* Surely the present system must be unjust. The motorist is severely punished for what is not a crime at all in others and now a motorist

may be punished with five years in jail for recklessness involving someone's death, when many other people may cause the death of someone recklessly with complete impunity.

It is suggested, then, that we should give the whole matter of the law relating to accidents very careful and impartial thought, possibly more on the lines of the present civil law, which is wholly and admirably impartial between the motorist and others. Enforcement may even be *responsible* for accidents, first by drawing attention away from their real causes, and secondly by leading other, non-motoring, road users to believe that they have no responsibility for accidents at all. Finally, it may be bringing the whole law itself into disrepute, by reason of the fact that that section of the population from which we expect the best of examples treats it with contempt, possibly a merited contempt.

But if negligence leading to death or injury is a criminal offence, what are we to say of a community which, through its Government, democratically elected, refuses out of parsimony to take measures which it knows will stop accidents, *i.e.* road improvements – engineering – and prefers to punish the motorist instead, in the quite mistaken idea that it saves money?

It will, of course, be urged that the remedy proposed is too drastic, in other words that we cannot trust the motorist. Some will also plead that the pedestrian and cyclist have a sacred right to behave as they like on the roads and that it is the duty of the motorist to save their lives, and that he must be punished if he does not do this.

This surely is irresponsible nonsense. It is a remarkable fact that foreigners are impressed by the high standard of behaviour of motorists in this country coupled sometimes with horror at the low standard of that of cyclists and pedestrians. Foreigners have also remarked on this in conversation with the Author. One German even went so far as to say that all German drivers should be made to drive in this country for six months to learn behaviour! This is praise indeed! All remark, above all, on the high standard of motoring courtesy.

This gets to the heart of the matter. The solution lies in the "hearts of men" in courtesy and consideration for others, the highest form of civic discipline. But courtesy and consideration must be

universal. It is not in human nature that one section will remain for ever courteous and considerate if it is universally abused, if it is treated as criminal, and if it receives no consideration from anyone else. Let us then inculcate courtesy and consideration from all to all, above all extending it to motorists, and treating them as the reasonable and decent people they really are. But the law must set a good example, and not a bad one as at present.

Connecticut's Plan to Meet Impact Of the 1956 Highway Act

WARREN M. CREAMER

Mr. Creamer has been Chief Engineer of the Connecticut State Highway Department for six years. Previously he was Director of Engineering and Construction, and prior to that, Engineer of Design. He was also State Manager of the Statewide Highway Planning Survey, a joint research project of the Bureau of Public Roads and the states. He was in charge of the location and general design for the Merritt Parkway and for portions of the Connecticut Turnpike. He is a past President of the Connecticut Society of Civil Engineers, a director of the Connecticut Chapter of the National Society of Professional Engineers, a member of the AASHO, the American Road Builders Association, the Highway Research Board and other professional engineering organizations. In 1953 Mr. Creamer won the General Motors prize essay contest for the State of Connecticut on the subject of "How to Plan and Pay for the Safe and Adequate Highways We Need."

THEODORE ROOSEVELT remarked that "After two hundred years of conversation, I built the Panama Canal." The Federal Aid Highway Act of 1956 ended an avalanche of public debate, professional and lay discussion, innumerable hearings, and special meetings. To analyze and correlate this gigantic mountain of material has been a task that can be better understood if the provisions of this measure are outlined.

The United States Bureau of Public Roads and the state highway officials have, more than any other group, helped to shape this huge master plan for overhauling that sprawling, inefficient and exhausted United States highway system. The system aims primarily at satisfying the needs of the national system of interstate and defense highways, a 41,000-mile network of modern roads and expressways to connect all of the states, linking together almost all of the American cities having populations of 50,000 or more.

The measure authorizes $24.8 billions of our federal funds for the interstate system. This money, plus some $2.6 billion contributed by the states, will complete a coast-to-coast system designed to provide for the traffic anticipated in 1975, when it is believed there will be more than ninety million registered motor vehicles. Traffic will be carried on divided expressways on the number of traffic-dictated lanes established by design.

The Cost

Marginal and internal stream friction will be removed and protection to drivers will be assured by carefully planned control of access. It is probable that four, eight, or more lanes will be prescribed for traffic flowing into and around large cities although the 7,000 lightly traveled miles of this system will be two-lane roads with provision in design for additional lanes as traffic requires them to be added.

Apart from the interstate system, the Federal Aid Highway Act of 1956 increases also the federal aid for other highways. The prior highway authorizations for the fiscal year 1957 were increased by $125,000,000 while federal aid was fixed at $850,000,000 for the fiscal year 1958, and $875,000,000 for the fiscal year 1959. These amounts are to be in the proportions of 45 percent for the federal aid primary system, 30 percent for the secondary system, and 25 percent for urban highways.

Federal aid is provided for road construction in national forests and parks or on Indian reservation roads. Alaska, for the first time, becomes eligible for federal aid for highways – primary, secondary, and urban – but only one-third of its huge land area will be used in calculating the apportionment.

'Greatest PW Program in History'

Since these funds are in addition to those provided for the interstate system, the 1956 Act will do much toward solving our perplexing highway problem.

Secretary of Commerce Sinclair Weeks described this bill as making possible "the greatest public works program in the history

of the world." Others call it the most gigantic undertaking since World War II. To those entrusted with public road administration, design, construction, and maintenance it presents a challenge. How shall that challenge be met?

Parts of this network will be under construction within a few months. The program will probably generate about 400 million dollars of additional highway construction during the remainder of this year. It will increase spending for highway construction from the current annual rate of about 5½ billion dollars to 8 or 9 billions by 1960. Planners expect all the new roads to be in use by 1970.

The key section of the 1956 Federal Aid Act deals with highways designated as the interstate system. This classification was first adopted in 1944 by the federal government to designate roads most important to defense and national economy.

Congress has given to the interstate system a priority in appropriations requiring states to put up less money in building those roads than on the other two federal aid road classifications. As in all other federal aid highway programs the letting of contracts and the supervision of construction will be in the hands of the state highway departments.

These new free expressways are expected to take the place of lagging toll-road construction. Although some 2,000 miles of these roads have been built, many are having financial difficulties. A recent statement by Under Secretary of Commerce, Louis S. Rothschild, indicates that the proposed construction of the interstate system will not conflict with the existing toll-road systems. A declaration of policy in favor of reimbursement to states having already built toll roads acceptable as part of the free interstate system was deleted from the highway bill as finally passed but the measure includes a provision for a study of the problem.

Five Major Studies

Under provisions of the 1956 Act, the Bureau, acting for the Secretary of Commerce and with the co-operation of the states and other agencies, is called upon to carry out five major studies. These studies are in the order in which they appear in the Act:

1. A study to provide the formula factors for apportionment of funds to the states for the fiscal years 1960, 1961, and 1962 (Sec. 108(d).)

2. A study to determine the maximum desirable sizes and weights of vehicles, described in 108(k). This section refers to the AASHO road test, and perhaps implies that the results of that test will fully answer the question.

3. A study to aid the Congress in determining a policy with respect to reimbursement for highways included in the interstate system, whether toll or free, which were constructed between 1947 and 1957.

4. Section 117 of the Act describes the fourth study, that of highway safety. This study is one which it is quite evident that the Congress intends to be a careful and reasonably deliberate study. Two items are planned for inclusion. One is a pilot study of the real causes of highway accidents and the other is a study of the effect of speed and horsepower on accident causation.

5. The fifth and last study, most difficult of all, the "incremental study," is outlined in Section 210. It calls for analysis of the cost of providing highway facilities for different classes of vehicles, and of benefits derived from highway use by all classes of users. The purpose is to provide Congress with a basis for determining equitable rates of taxation on highway users and other beneficiaries. It is a complex, perplexing problem.

On the interstate system projects solely, prevailing wages provided in the Davis-Bacon Act will be established by the Secretary of Labor after consultation with the state highway departments. Interstate funds are available to the states only under certain conditions and codes as to the size and weight of vehicles permitted by each state. The maximum weight and width limitations are: 18,000 pounds on a single axle, 32,000 pounds on a tandem axle, and an overall gross weight of 73,280 pounds, and a width of ninety-six inches. These dimensions and loadings are prescribed unless the maximum corresponding weights or widths permitted under state laws in effect July 1, 1956 are greater.

Under the provisions of the act the interstate system is increased from 40,000 miles to 41,000 miles and requests for additions have

been forwarded by several states. The department of defense is co-operating in the review of requests submitted.

The 1957 and 1958 funds for the interstate system are apportioned to the states by the Secretary of Commerce as provided by law – two-thirds by population, one-sixth by area, and one-sixth by post-road mileage. The 1957 funds were apportioned on June 29, 1956 by the Secretary of Commerce after the Act was signed by the President and the 1958 apportionment, based on request of the AASHO, made on August 1, 1956.

The 1959 funds will be apportioned under the same formula, but the remaining interstate system funds will be apportioned as now provided in the Act in the ratio that the estimated cost of completing the system in each state bears to the total cost of completing the entire system.

Revised Technology Streamlines Procedures

Because of the engineering involved in the plans required by the Act, the United States Bureau of Public Roads, the state highway departments, the Highway Research Board and other agencies have been revising technology to streamline design procedures. One of the most significant accomplishments was the publication by the Highway Research Board of fourteen brochures dealing with time-saving methods in highway engineering. Chapter 1 is devoted to administration, Chapter 2, to time-saving methods in planning (statistics, economic analysis, etc.), and Chapter 3, to time-saving methods in location. Chapter 4 is devoted to time-saving methods in road design, Chapter 5, to time-saving methods in bridge design, Chapter 6, time-saving methods in construction, and Chapter 7, to time-saving methods in contracts, estimates and specifications. Chapter 8 is devoted to time-saving methods in materials and tests, Chapter 9, to time-saving methods in soils and foundations, Chapter 10, to time-saving methods in highway engineering, as to maintenance and equipment, and Chapter 11, to time-saving methods in traffic engineering (management of traffic operations, etc). Chapter 12, to time-saving methods in the acquisition of rights of way, Chapter 13, to time-saving methods in cost

accounting and control, and Chapter 14, to dealing with the summary, selected references and subject index.

The wealth of information in this report of the Highway Research Board results from a co-operative endeavor that included contributions from about 300 highway engineers and technicians. The application of these time-saving methods will be of great value to the state highway departments in the greatly accelerated design load.

To hasten the production of the required plans, it will be necessary to make advance right-of-way acquisitions. In this activity California sets a good example. When real estate developments and building activities were encroaching on highway locations needed for future development, the state highway department realized the necessity of early action. In 1952, legislation was enacted to authorize the acquisition of properties for state highway purposes in cases where prospective land developments would have met much higher costs if acquisition were to be delayed. Ten million dollars was appropriated.

The 1953 legislature amended the former act by establishing a true revolving fund. This law provides that when properties are purchased with advance acquisition funds they are held until needed for highway construction. The cost is deposited in the fund from amounts set aside for the project, thus making this amount available for re-use in acquiring other needed rights of way. Under certain conditions, this Act also provides for the transfer of an additional $20 million to the revolving fund, making a total of $30 million available for advance acquisition.

A further aid to rapid, accurate design, in the face of heavy demands on personnel, is the digital computer. Electronic methods have been explored at important conferences in the last year by experts from the Bureau of Public Roads. The teamwork of highway departments in exchanging experiences with this new development has brought out the value of photogrammetric survey methods combined with the electronic computer.

Earthwork quantities can be computed without going through the laborious, time-consuming process of drawing cross-sections, planimetering and computing. The computers are useful also in analyzing traffic data, assisting in complicated problems of stresses

in bridges, the solution of traverses and indeed any repetitive engineering method. The general designs for the interstate system must follow implicitly the standards adopted by the American Association of State Highway Officials at a meeting of the Committee on Administration, on July 12, 1956.

No Alarming Standards

Adopted standards, not impractically high, should not alarm engineers trained to design for both adequacy and economy. The design speed has been fixed at a minimum of seventy, sixty, and fifty miles an hour for flat, rolling, and mountainous topography, respectively, and at least fifty miles an hour in urban areas. Visible elements of the highway, termed geometric features, will accord with the policies on geometric design of the AASHO.

Traffic lanes are to be at least twelve feet wide while bridges will carry the full roadway width across from backwall to backwall unless they are very long, and clearances at underpasses are to be at least eight feet on the right and four and one-half feet on the left, with the commonly used minimum vertical clearance of fourteen feet. Bridges are to be designed for the H-20, S16(44) loading of the American Association of State Highway Officials.

The shortage of highway engineers has developed discussions concerning the engineering manpower necessary to carry on the greatly increased program of capital outlay for highways. To determine the engineering manpower required, it is essential to assess the engineering needs. It is then necessary to develop recruitment programs to satisfy these needs. It is important to examine carefully the highway engineering employment situation as it presently exists and to what extent it can be expanded.

The lack of an accepted definition clearly stating the essential characteristics of an engineer has made it difficult to determine the number of engineers employed in the highway industry, public and private. In the June 1956 issue of *Public Roads*, Robley Winfrey, chief of the Bureau of Public Roads personnel and training office, states in part this conclusion:

"In summary the conclusions must be that the number of engineers and engineering aids employed by the forty-eight state

highway departments are not known. For discussion, a total of 20,000 engineers and 20,000 engineering aids is used. Of the 20,000 engineers, 1,300 are assumed to be primarily maintenance engineers, leaving 18,700 engaged in duties pertaining to construction."

In a somewhat similar study,"A Six-State Classification Study of Engineering Personnel," Ralph S. Lewis, in the same issue of *Public Roads*, says that "these states were employing twelve engineers per million dollars of capital outlay and that the ratio of engineers to engineering aids was one to one. A previous research study by Mr. Campbell and Mr. Shureman of the Highway Research Board found that the ratio of engineers per million dollars of construction varied from 2.0 to 28.2 state to state with a median ratio of 7.2."

The 1955 construction expenditures by the state highway departments total about $2.5 billion, which at 7.2 engineers per million dollars indicates a requirement of 18,000 engineers.

A greatly enlarged highway construction program – let us say a program increased by two billion dollars annually -- would require an additional employment of 14,400 engineers and 14,400 engineering aids. Mr. Winfrey comments on this phase of the problem as follows:

"Whether the increased program were handled wholly by the states, or by the states and consultants, the manpower requirements would be approximately the same. This requirement is 80 percent of the current employment in the engineering operations. The 14,400 additional engineers are just not available, so how can the program be supplied with adequate engineering services ?"

Mr. Winfrey further states, "Assuming the use of the ratio of five engineers and ten engineering aids for the new construction program of $2 billion in addition to the current state highway department program of about $2.5 billion, the total requirement for $4.5 billion would be 22,500 engineers and 45,000 engineering aids. These two estimates compare with the previous estimate of 18,700 engineers and 20,000 engineering aids presently employed by state highway departments. The necessary increases would be 3,800 engineers and 25,000 engineering aids. Recruiting these numbers should be possible under a planned program and with determination to do so."

From the standpoint of the national economy, this vast construction program will have a far-reaching effect on the nation's economy. In 1955, the construction industry employed approximately 240,000 persons. It is estimated that when the building program gets fully under way approximately 630,000 persons may be working on the roads at summer peak periods. Thousands of other additions will have to be made in the supply industries. According to a recent survey by the Associated General Contractors of America, Inc., the major highway contractors are capable of doubling their capacity in two years. Steel and cement are the two road building materials now in shortest supply, but both of these industries are engaged in major expansion programs. Companies selling other basic materials, such as sand and gravel, are now producing below capacity.

The new roads will be financed on a pay-as-you-go basis, with highway users footing the bill. The biggest single money raiser is a gasoline tax increase, which has already boosted the federal tax on gas from two to three cents. This increase and others on such things as tires are expected to raise the average motorist's fuel and tire expense by $6 to $9 a year and produce an extra $14,814,000,000 during the next sixteen years.

The difference between this sum and the federal cost of the highway construction will be made up from the revenue of highway user taxes previously in effect. Up until the new bill became law, these highway user tax receipts went into the Treasury's General Fund and were used for many purposes other than road building. From now on, most highway-user taxes will go into a special fund and be used solely for roads.

On March 8, 1957 the Connecticut State Highway Commissioner released a report to the Governor and the General Assembly relative to the status of the highway construction program. This report indicated that during the 1955–1957 biennium the Department would have awarded or have plans available for projects totaling $145 million exclusive of the work on the Connecticut Turnpike.

This program is divided as follows: Restoration of flood damaged town roads and bridges, $18,150,000; restoration of state roads and bridges damaged by the floods of 1955, $21 million; and

the construction program on the state-maintained system of highways other than projects included in the flood damage, $106 million. The fulfillment of this anticipated program is dependent upon the passage by the legislature of three very important pieces of legislation. H. B. 1633 proposes that an additional $1 million be appropriated from the flood fund to finance the restoration work on the flood-damaged town roads and bridges.

H. B. 1630 proposed the advance appropriation of $15 million from anticipated revenues of the 1957–1958 fiscal year in order that this appropriation might be available for commitment purposes prior to June 30, 1957. H.B. 1747 establishes a revised method of recording federal aid reimbursements and facilitates the financing of the federal aid projects undertaken under the Federal Aid Highway Act of 1956. The passage of the latter two bills, H. B. 1630 and H. B. 1747, will make additional financing of approximately $34,600,000 available for the highway department in order that the projects which are expected to be completely designed and ready for advertising may be awarded during the current fiscal year.

The department expects to complete plans for projects having a total cost of approximately 136 $million during the 1957–1959 biennium. Of this $136 million, approximately $44 million will be for projects which were originally listed as part of the 1955-1957 program either in full or as a stage construction contract of an overall improvement. The department also expects to develop an additional $92 million of projects during the 1957–1959 biennium.

The placing of these projects under contract for construction during the biennium is dependent upon the department's acquiring during this period the necessary rights of way as well as the completion of the necessary engineering and construction drawings and further, the availability of funds for the financing of the work. The department has proposed that the present six cents a gallon motor fuels tax presently scheduled to expire on June 30, 1958, be indefinitely extended. The passage of this bill, together with the previously mentioned H. B. 1747, is estimated to make available to the highway department during the coming biennium $99 million, leaving a balance of $37 million for contract plans which will be available at the beginning of the 1959–1961 biennium.

In the 1957–1959 program are included approximately $48 million of projects on the interstate system in Connecticut. The highway department has engaged the services of thirty-one private engineering firms to perform one or more of the functions of planning, survey, design and–or supervision of construction in connection with fifty-six projects undertaken in the flood restoration and regular highway program.

This is an indication of the inability of the highway department to process this large program with its own forces. The department, with these private engineering firms, has proceeded to develop or is in the process of developing plans for a great volume of work, particularly in connection with the interstate system as the projects on this system require long range integration in order that the design of the individual contract may fit into the ultimate project on the entire length of the route.

This is particularly notable in the Danbury area where the plans are being developed for the entire section from the New York state line easterly to Sandy Hook but on which construction will be undertaken only in the vicinity of Danbury during the 1957–1959 biennium. Similarly, planning is being undertaken in the Middlebury–Waterbury area although construction during the biennium will be confined to the Waterbury area.

The highway department has also been co-operating with the Greater Hartford Bridge Authority in the development of the proposal for approaches to the bridges across the Connecticut River. During the present biennium the department has also been using many of its experienced personnel on the construction of the Connecticut Turnpike.

A combination of the two flood-damage programs and the Connecticut Turnpike added to the regular state-maintained highway program during the present biennium have been of such scope that even with the large amount of work scheduled to be placed under contract during the next biennium, there will be a reduction in the actual dollar value of the projects to be placed under contract during the next biennium as compared with that of the present biennium.

Safe Transportation of Migrant Agricultural Workers

PAUL E. GURSKE

Mr. Gurske is Director, Bureau of Labor Standards, United States Department of Labor. Previously, he was for eleven years a member of the Oregon State Industrial Accident Commission, ten years as chairman, administering the state workmen's compensation fund and occupational safety program. Mr. Gurske organized and presided at nine state-wide occupational safety conferences and was chairman of the Governor's Safety Advisory Committee, the Federal Safety Council, and other conferences. He is also a member of the Board of Directors of the National Safety Council and secretary-treasurer of the International Association of Industrial Accident Boards and Commissions.

MIGRATORY farm workers are essential to agricultural production in areas that specialize in crops having a short but high seasonal labor demand. For the most part, these workers find employment in the southern states during the winter months, move northward in the spring and summer as the harvest season advances, and return to their southern base in the fall.

One of the many hardships they experience in this way of living is the conditions under which they are transported from one place of work to another and the traffic hazards to which they are exposed. Recognizing this, and disturbed by numerous fatal or serious accidents involving trucks carrying such workers, the President's Committee on Migratory Labor made transportation problems one of its first considerations following its formation in October, 1954.

This committee is composed of the Secretaries of Agriculture, Interior, Labor, Health, Education and Welfare, and the Administrator of the Housing and Home Finance Agency. It was established by the President to aid the various Federal agencies in mobilizing and stimulating more effective programs and services for migrant farm workers. Its broad program covers, in addition to transportation, all aspects of the migrant labor problems–housing, community acceptance, education, child care, medical care and working conditions.

Conspicuous because of the conditions under which they travel, migrant farm workers are easily spotted on the highway during harvest seasons. Frequently, men, women and children are packed together in dilapidated open trucks having no seats and no protection from the weather. Occupants ride standing up, clinging to one another, or uncomfortably perched on top of their personal belongings.

Families from Florida may travel in this manner as far north as New York. Truck loads of workers fanning out from Texas through the western and mid-western states may have Washington, Minnesota or Michigan as their destination. Even on these long hauls, in general, little regard is paid to their safety or comfort. Numerous workers have reported non-stop trips from Texas to Michigan.

One 17-year-old driver was involved in an accident in which a tractor-cattle truck packed with eighty-five workers crashed, killing eleven men and injuring fifty-six others; he told officers investigating the accident that he had fallen asleep at the wheel after excessive hours of driving. Many of the vehicles in which migrant workers are obliged to travel are unsafe, a hazard not only to the occupants but to others traveling the highways as well.

Official investigations of the many accidents involving farm workers have revealed inexcusable conditions – broken or inferior equipment, faulty mechanisms, unqualified drivers, dangerous overcrowding, and driver exhaustion. Many, if not all, of the accidents could have been avoided had reasonable precautions been taken.

Committee Suggests Safety Standards

In considering the problems of insuring safety and reasonable comfort in transportation to these workers, the President's Committee recognized, as previous investigatory committees have, the need for both state and Federal action to meet the situation fully. It also recognized the desirability of some degree of uniformity in safety standards both between states and between state and Federal programs.

To encourage state action and provide a basis for uniformity of standards, the committee drew up "suggested regulations for the transportation of farm workers by motor vehicle" as a guide for

states in developing and setting up controls. These suggested standards were developed in consultation with representatives of the Interstate Commerce Commission, the Council of State Governments, the National Committee on Uniform Traffic Laws and Ordinances and with state officials concerned with traffic regulation.

As will be seen from the text of the regulations, which appear at the end of this article, they are designed to provide safety of equipment and truck operation and a minimum of comfort for the workers. The transportation of passengers by truck can, of course, achieve neither the safety nor comfort of vehicles designed for passenger use, but these regulations, if applied, would vastly improve present conditions of travel.

Copies of these suggested regulations have been sent by the Secretary of Labor, Chairman of the President's Committee on Migratory Labor, to the governors of the respective states for their consideration. They have also been sent to State Farm Bureaus and to other appropriate state agencies. The interest of the states, indicated by the responses received, has been encouraging.

In submitting the regulations to the states the President's Committee pointed out the need for Federal regulation also, as a corollary to state action. This was in line with recommendations made by the 1947 Federal Inter-agency Migratory Labor Committee and the 1951 President's Commission on Migratory Labor, both of which gave extensive study and consideration to this as well as other phases of the migratory labor problem.

Subsequently, in the 84th Congress, the Interstate Commerce Act was amended to extend the authority of the Interstate Commerce Commission with respect to common carriers to include the regulation of private carriers, including contract carriers, transporting farm workers across state lines. Specifically, the amendment requires the commission to establish for "carriers of migrant farm workers by motor vehicle" reasonable requirements in respect to "comfort of passengers, qualifications and maximum hours of service of operators of vehicles and safety of operation and equipment." This authority is limited to vehicles carrying three or more workers and those traveling 75 miles or more across state lines.

The commission has drafted proposed regulations in this area which are now under consideration pending final adoption. These

proposed regulations for interstate transportation of farm workers follow closely the suggested regulations of the President's Committee for intra-state transportation of such workers.

Regulatory Measures Recently Begun

To date there has been comparatively little state regulation of farm labor transportation. Several states, however, notably California, Connecticut and Oregon, have tackled the problem and made substantial progress both in establishing adequate regulatory measures and in enforcing them effectively. This experience in states with a sizeable farm labor population demonstrates that proper regulation can effectively reduce the number of accidents involving transportation of farm labor.

California began its program of controls with regulations established by the Department of Industrial Regulations under its authority to establish safety codes for industry. Later, to strengthen these regulations, the State Vehicle Code was amended to include safety provisions specifically pertaining to trucks used "primarily or regularly" for the transportation of workers.

The California regulations cover construction, inspection and operation of vehicles, licensing of qualified operators, and safety of passengers. Close co-operation is maintained between the State Highway Patrol and the State Department of Industrial Relations in enforcing these safety standards. In 1955, the first year of the two departments' co-operation in the program, fatalities arising from accidents involving farm workers were reduced from forty-seven to twenty-eight, while total non-fatal disabling injuries fell from 341 to 161.

The Connecticut "Farm Transport Program" was inaugurated in 1945 under the direction of the governor. It came about when a series of accidents involving farm workers brought complaints from local citizens about the unsafe conditions in transporting these workers to farms in various parts of the state.

In addition to the strict enforcement of a Farm Transport Code, an educational program is carried on each spring prior to the beginning of the farm season. Through newspapers, radio, personal notices to growers, and group conferences scheduled in advance,

growers are reminded of their responsibility for safe transportation of their workers and their co-operation enlisted in meeting these responsibilities. The Commissioner of the State Department of Motor Vehicles reported recently that this program has almost completely eliminated accidents to vehicles carrying farm workers.

Another result of the program has been an appreciable decrease in the use of trucks and increased use of buses for transporting workers. An important factor in its success has been the co-operation from growers who were quick to appreciate the benefits they derived from it.

In Oregon, as in California, a safety code governing the transportation of farm workers was adopted as part of a general safety manual. It deals with the safe condition of vehicles transporting workers, qualifications and responsibilites of operators, and with the conduct of passengers so far as this affects their safety. The code has been in effect since 1944.

Interstate Regulation Essential

Reluctance of the states in the past to set up controls to insure the safe transportation of migrant farm workers within their borders has been due, in some measure, to their conviction that state regulation alone would not meet the need; that Federal regulation of interstate transportation was likewise essential to solving the problem.

As one state official pointed out in discussing the suggested intrastate regulations of the President's Committee, the large proportion of migrant workers cross state lines. Their travels begin at a point beyond the control of the states through which they pass. It is too late to require compliance with safety standards when a vehicle arrives at the state border. These requirements should be met before the start of the journey.

Furthermore, many state officials believed it was often impractical and unfair to put a state in the position of having to turn back trucks at the border when crops might be spoiling for want of harvest hands.

Now that this obstacle has been removed by the amendment of the Interstate Commerce Act giving the commission specific author-

ity to regulate interstate transportation of migrant farm workers, it is hoped that the states will seriously consider setting up similar safety controls for intrastate transportation of these workers. Traffic hazards and other abuses prevailing in the past have not been limited to interstate transportation.

Establishment of safety regulations by the states, some measure of uniformity in safety standards between states – with the suggested regulations of the President's Committee offered as a guide – and active co-operation between Federal and state enforcement agencies could greatly improve the lot of the migrant farm worker. This improvement would also serve the interests of employers and the public.

Suggested Regulations for Transportation of Agricultural Workers by Motor Vehicle

PART 0 – DEFINITIONS:

The following words when used in this Chapter shall have the meanings respectively ascribed to them in this Part.

Sec. 0–1 Bus

Any motor vehicle designed for carrying more than 10 passengers and used for the transportation of persons; and any motor vehicle, other than a taxicab, designed and used for the transportation of persons for compensation.

Sec. 0–2 Truck

Any motor vehicle designed, used or maintained primarily for the transportation of property.

Sec. 0–3 Truck Tractor

Any motor vehicle designed and used primarily for drawing other vehicles and not so constructed as to carry a load other than a part of the weight of the vehicle and load so drawn.

Sec. 0–4 Semitrailer

Any vehicle with or without motive power other than a pole trailer, designed for carrying persons or property and for being drawn by a motor vehicle and so constructed that some part of its weight and that of its load rests upon or is carried by another vehicle.

Sec. 0–5 Highway

The entire width between the boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel.

Sec. 0–6 Private Carrier

Any person not included in the terms "common carrier by motor vehicle"or"contract carrier by motor vehicle" as defined in section 203(a) of the Interstate Commerce Act, as amended, 49 U.S.C. 303(a), who or which transports workers by any motor vehicle other than a passenger automobile.

Sec. 0–7 Worker

Any individual engaged in, proceeding to or returning from employment in agriculture as defined in section 3(f) of the Fair Labor Standards Act of 1938, as amended, 29 U.S.C. 203(f).

Sec. 0–8 Applicability

Parts 0 to 8 of this Chapter shall be applicable to private carriers, their agents and employees. Every private carirer shall comply with the requirements of this part, shall instruct its officers, agents, representatives and drivers with respect thereto, and shall take such measures as are necessary to insure compliance therewith by such persons. All

officers, agents, representatives, drivers, and employees of private carriers directly concerned with the management, maintenance, operation, or driving of motor vehicles, shall comply with and be conversant with the requirements of this Chapter.

PART ONE – QUALIFICATIONS OF DRIVERS:

Sec. 1–1 Minimum Requirements

Drivers for private carriers shall be subject to the applicable requirements and driving qualifications specified for drivers of school buses by Sec. 6–101 through 6–306 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances.

PART 2 – DRIVING OF MOTOR VEHICLES:

Sec. 2–1 Driving Rules

Every motor vehicle shall be driven in accordance with the Rules of the Road prescribed by sections 11–101 through 11–1304 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances except insofar as a greater affirmative obligation or restraint may be imposed by this part.

Sec. 2–2 Schedules to Conform with Speed Limits

No private carrier shall schedule a run nor permit or require the operation of any motor vehicle between points in such period of time as would necessitate the vehicle's being operated at speeds greater than those prescribed for school buses by the jurisdiction in or through which the vehicle is being operated.

Sec. 2–3 Safe Loading

(*a*) *Distribution and Securing of Load*

No motor vehicle shall be driven nor shall any private carrier permit or require any motor vehicle to be driven if it is so loaded or if the load thereon is improperly distributed or so inadequately secured, as to prevent its safe operation.

(*b*) *Doors, Tarpaulins, Tailgates and Other Equipment*

No motor vehicle shall be driven unless the tailgate, tailboard, tarpaulins, doors, all equipment and rigging used in the operation of said vehicle or for the convenience of passengers and all means of fastening the load and protecting the passengers are securely in place.

(*c*) *Interference With Driver*

No motor vehicle shall be driven when the passengers or any object obscures the driver's view ahead, or to the right or left side, or interferes with the free movement of his arms or legs, or prevents his free and ready access to the accessories required for emergencies, or prevents the free and ready exit of any person from the vehicle.

(*d*) *Property on Motor Vehicles*

No motor vehicle transporting workers and property shall be driven unless such property is stowed in a manner which will assure: (1) unrestricted freedom of motion to the driver for proper operation of the vehicle; (2) unobstructed passage to all exits by any person; and (3) adequate protection to passengers and others from injury as a result of the displacement or falling of such property.

(*e*) *Maximum Passengers on Motor Vehicles*

No motor vehicle shall be driven if the total number of passengers, less one if a passenger is carried in the truck cab, exceeds the seating capacity permitted on the seats prescribed in section 3–3(d) and all passengers thereon shall remain seated while the motor vehicle is in operation.

Sec. 2–4 Rest Stops

Every private carrier shall provide not less than one rest stop of not less than 15 minutes at not more than two hour intervals. Stops for meals shall be made whenever necessary and shall be for no less than 30 minutes.

Sec. 2–5 Kinds of Motor Vehicles in Which Workers May Be Transported

Workers may be transported by private carriers in or on only the following types of motor vehicles: a bus, a truck with no trailer attached, or a semitrailer attached to a truck tractor provided that no other trailer is attached to the semitrailer.

Sec. 2–6 Interval of Day for Travel

No motor vehicle other than a bus shall be driven nor shall any private carrier permit or require any such motor vehicle transporting workers to be driven before 6 o'clock in

the morning nor after 8 o'clock in the evening. For the purpose of this section the time standard in effect at the place of beginning the day's travel shall be used. This section shall not be applicable to vehicles transporting workers to and from their employment in the same day.

Sec. 2–7 Obscured Lamps or Reflectors

No motor vehicle shall be driven when any of the required lamps or reflectors are obscured by the tailboard, by any part of the load, by dirt, or otherwise.

Sec. 2–8 Ignition of Fuel: Prevention

No driver or any employee of a private carrier shall: (a) Fuel a motor vehicle with the engine running, except when it is necessary to run the engine to fuel the vehicle; (b) Smoke or expose any open flame in the vicinity of a vehicle being fueled; (c) Fuel a motor vehicle unless the nozzle of the fuel hose is continuously in contact with the intake pipe of the fuel tank; (d) Permit any other person to engage in such activities as would be likely to result in fire or explosion.

Sec. 2–9 Reserve Fuel

No supply of fuel for the propulsion of any motor vehicle or for the operation of any accessory thereof shall be carried on that motor vehicle except in a properly mounted fuel tank or tanks.

Sec. 2–10 Driving by Unauthorized Person

Except in case of emergency, no driver shall permit a motor vehicle to which he is assigned to be driven by any person not authorized to drive such a vehicle by the private carrier in control thereof.

PART 3 – EQUIPMENT OF VEHICLES:

Sec. 3–1 Equipment Required

Every bus, truck, or semitrailer shall be equipped and operated in accordance with the applicable requirements of Section 12–101 through 12–410 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances, except insofar as a greater affirmative obligation or restraint is imposed by this part.

Sec. 3–2 Coupling Devices and Towing Methods

(*a*) *Fifth Wheel Mounting*

The lower half of every fifth wheel mounted on any truck or dolly shall be securely affixed to the frame thereof by U-bolts of adequate size, securely tightened, or by other means providing at least equivalent security. Such U-bolts shall not be of welded construction. The installation shall be such as not to cause cracking, warping, or deformation of the frame. Adequate means shall be provided positively to prevent the shifting of the lower half of a fifth wheel on the frame to which it is attached.

(*b*) *Fifth Wheel, Securing*

The upper half of every fifth wheel shall be fastened to the motor vehicle with at least the security required for the securing of the lower half to a truck tractor or dolly.

(*c*) *Fifth Wheel, Locking*

Locking means shall be provided in every fifth wheel mechanism including adapters when used, so that the upper and lower halves may not be separated without the operation of a positive manual release. A release mechanism operated by the driver from the cab shall be deemed to meet this requirement. On fifth wheels designed and constructed as to be readily separable, the fifth wheel locking devices shall apply automatically on coupling for any motor vehicle the date of manufacture of which is subsequent to December 31, 1952.

Sec. 3–3 Passenger Compartment

Every motor vehicle transporting workers for a private carrier, which was not designed and constructed to carry passengers, shall have a passenger compartment in accordance with the following requirements:

(*a*) *Floors*

A substantially smooth floor, without protruding obstructions more than two inches high, except as are necessary for securing seats or other devices to the floor, and without cracks more than one inch wide or holes more than one inch in diameter.

(*b*) *Sides*

Side walls and ends above the floor at least 60 inches high, by attachment of sideboards to the permanent body construction if necessary. Stake body construction shall be construed to comply with this requirement only if all six-inch or larger spaces between stakes are suitably closed to prevent passengers from falling off the vehicle.

(*c*) *Nails, Screws, Splinters*

The floor and the interior of the sides and ends of the passenger-carrying space shall be free of inwardly protruding nails, screws, splinters, or other projecting objects, likely to be injurious to passengers or their apparel.

(*d*) *Seats*

A seat for each worker transported. The seats shall be: (1) securely attached to the vehicle during the course of transportation; (2) not less than 16 inches nor more than 19 inches above the floor; (3) at least 13 inches deep; (4) equipped with backrests extending to a height of at least 36 inches above the floor, with at least 24 inches of space between the backrests or between the edges of the opposite seats when face to face; (5) designed to provide at least 18 inches of seat for each passenger; (6) without cracks more than one-fourth inch wide, and the backrests, if slatted, without cracks more than two inches wide, and (7) the exposed surfaces, if made of wood, planed or sanded smooth and free of splinters.

(*e*) *Protection From Weather*

Whenever necessary to protect the passengers from inclement weather conditions a top at least 80 inches high above the floor and facilities for closing the sides and ends of the passenger-carrying compartment. Tarpaulins or other such removable devices for protection from the weather shall be secured in place.

(*f*) *Exit*

Adequate means of ingress and egress to and from the passenger space shall be provided on the rear or at the right side. Such means of ingress and egress shall be at least 18 inches wide. The top shall be at least 60 inches high. The bottom shall be at the floor of the passenger space, except where ingress and egress requires climbing over an obstruction. The clear opening shall in any event be not less than 36 inches high.

(*g*) *Gates or Doors*

Gates or doors shall be provided to close the means of ingress and egress and each such gate or door shall be equipped with at least one latch or other fastening device of such construction as to keep the gate or door securely closed during the course of transportation; and readily operative without the use of tools.

(*h*) *Ladders or Steps*

Ladders or steps for the purpose of ingress or egress shall be used when necessary and shall remain firmly attached to the vehicle during the course of transportation. The maximum vertical spacing of footholds shall not exceed 12 inches, except that the lowest step may be not more than 18 inches above the ground when the vehicle is empty.

(*i*) *Hand Holds*

Hand holds or devices for similar purposes shall be provided to permit ingress and egress without hazard to passengers.

(*j*) *Emergency Exit*

Vehicles with permanently affixed roofs shall be equipped with at least one emergency exit having a gate or door, latch and hand hold as prescribed in paragraphs (*g*) and (*i*) of this section and located on a side or rear not equipped with the exit prescribed in paragraph (*f*) of this section.

(*k*) *Communication with Driver*

Means shall be provided to enable the passengers to communicate with the drivers. Such means may include telephone, speaker tubes, buzzers, pull cords, or other mechanical or electrical means.

Sec. 3–4 Heaters

Every motor vehicle not designed to carry passengers when used in temperatures below 60 degrees Fahrenheit shall be equipped with a heater adequate to maintain a temperature of 60 degrees Fahrenheit under all ordinary weather conditions expected during the season and in the locations where it is used for the transportation of workers. The term "heater" as used in this section means any device or assembly of devices or appliances used to heat the interior of any motor vehicle. The installation or uses of the following types of heaters is prohibited: (1) Exhaust heaters – any type of exhaust heater in which the engine gases are conducted into or through any space occupied by persons or any heater which conducts engine-compartment air into any such space. (2) Unenclosed flame heaters – any type of heater employing a flame which is not fully enclosed. (3) Heaters permitting fuel leak-

age – any type of heater from the burner of which there could be spillage or leakage of fuel upon the tilting or overturning of the vehicle in which it is mounted. (4) Heaters permitting air contamination – any heater taking air, heated or to be heated, from the engine compartment or from direct contact with any portion of the exhaust system; or any heater taking air in ducts from the outside atmosphere to be conveyed through the engine compartment, unless said ducts are so constructed and installed as to prevent contamination of the air so conveyed by exhaust or engine compartment gases. (5) Solid fuel heaters except wood charcoal – any stove or other heater employing solid fuel except wood charcoal. This section shall not be applicable to vehicles transporting workers to and from their employment in the same day.

PART 4 – REPORTING OF ACCIDENTS:

Sec. 4–1 Accidents and Accident Reports

Every driver of a motor vehicle shall in the event of accident comply with the requirements specified in Section 10–102 through 10–108, 10–111, and 10–114 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances.

PART 5 – HOURS OF SERVICE OF DRIVERS:

Sec. 5–1 Maximum Driving Time

Except as otherwise provided in this section, no private carrier shall permit or require a driver employed or used by it to drive or operate for more than 10 hours in the aggregate excluding rest stops and stops for meals in any period of 24 consecutive hours, unless such driver be off duty for 8 consecutive hours immediately following the 10 hours aggregate driving and within said period of 24 consecutive hours. The term "24 consecutive hours" as used in this part means any such period starting at the time the driver reports for duty. In case of snow, sleet, fog, or other adverse weather conditions a driver may be permitted to drive or operate a motor vehicle for not more than 12 hours in the aggregate in any period of 24 consecutive hours in order to complete the run, without being off duty for a period of 8 consecutive hours, subject to the limits prescribed by section 2–6.

PART 6 – INSPECTION AND MAINTENANCE OF MOTOR VEHICLES:

Sec. 6–1 Inspection and Maintenance of Private Carrier

Every private carrier shall systematically inspect and maintain or cause to be systematically maintained, all motor vehicles and their accessories subject to its control, to insure that such motor vehicles and accessories are in safe and proper operating condition.

Sec. 6–2 Official Inspection

Motor vehicles operated by private carriers shall be subject to official inspection as provided in Sections 13–101 through 13–109 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances.

PART 7 – SANCTIONS:

Sec. 7–1

Except as otherwise provided in those provisions of the Uniform Code made applicable by this Chapter, it shall be a misdemeanor for any private carrier or his agent to do any act forbidden or fail to perform any act required by this Chapter.

PART 8 – FINANCIAL RESPONSIBILITY:

Sec. 8–1

Private carriers shall be subject to the financial responsibility provisions specified in Sections 7–101 through 7–505 of the Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances.

Applying New Electronic Computers To Traffic and Highway Problems

ERNEST E. BLANCHE

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SLOWLY but steadily, high-speed electronic computers have entered the field of data processing and analyzing traffic and highway data, much as the automobile entered the transportation field at the turn of the century. Use of this new device by traffic engineers is in its infancy, primarily because they have not been acquainted with computer capabilities and potentials.

When properly used, high-speed computers can process data and make computations faster and more accurately than manual methods or conventional processing on standard punch card equipment. Sometimes the processing is cheaper, sometimes more expensive. There is a dividing line between savings by using or not using a high-speed computer and it is essential to know precisely where this dividing line is to avoid misunderstanding the cost of such work.

For some projects, the high-speed computer can be used effectively, efficiently and economically; for other projects, regardless of how efficiently the computer is used, the cost is far out of proportion to the service rendered. In some instances, it is some-

what like sending a ten-ton tractor-trailer to deliver a fifty-pound package.

The high-speed computers discussed here can carry out computations to as many digits as desired with absolute accuracy. These computers are in direct contrast with the analog types which, because of their dependence upon mechanical devices, electrical resistance or voltage and associated meters, are accurate to only a few places, much like the slide rule.

Digital computers were developed during World War II primarily for speeding up ballistic computations and preparing ballistic tables for various types of artillery and other weapons. Because of the high cost of research and development, early computers were sponsored by government military agencies. After the war when the basic patterns had been fully tested in war-time applications, some manufacturers began to produce computers for commercial use.

At first the high-speed computers were completely over-sold as being "giant brains" capable of solving any problem. Many persons expected push-button equipment which would solve their complex problems without human planning or preparation. They were dismayed to find that an electronic computer is rather stupid —it can only do those operations it is specifically told to do by a set of instructions prepared in advance by human beings.

This set of instructions is called a program or code. It tells the machine what to do in a sequence of steps identifying the items of the basic data to be handled and the arithmetic and other operations to be conducted.

The preparation of a program or code is a highly specialized field demanding a complete understanding of the capabilities and limitations of a particular equipment. The programming for one piece of equipment is usually entirely different from the programming for other types of equipment.

The purpose here is to indicate the types of high-speed computers that can be used, and to point out where such computers are being used in traffic and highway work and can be used there in the future. To those who would jump headlong into computer applications let there be this word of caution: Much time, money,

and much heartache will be required before you can get the computer to understand you and to do what you want.

Types of Computers

The basic characteristics of high-speed computers are:

1. High-speed input and output of data.

2. Arithmetic and other operations at rates of thousands a minute or second.

3. The ability to store internally certain selected data or answers until called for. This storage feature (memory) permits a variety of operations to be done in sequence according to a program that consists of a sufficiently large number of steps to accomplish a large amount of computation at one time. Computers are usually rated as to their capacity and capabilities by the amount of storage available in terms of digits or words (a fixed number of digits) and the number of program steps available. The internal speed of computation is relative and is usually (but not always) associated with the speed of input and output.

There are various means of introducing basic data into a high-speed computer. Some machines provide for one or several types of input. These are:

1. Punch cards of the 90-column type or the 80-column type prepared in advance.

2. Punched paper tape prepared in advance.

3. Magnetic tape prepared in advance.

4. Direct manual insertion by means of a specially-connected typewriter or similar device.

The output medium, usually the same as input, may be either magnetic tape, punch cards, punched paper tape, or printed matter on a connected typewriter or similar device.

Input by typewriter or similar device is relatively slow in relation to the speed of the computer and is usually not employed unless special corrections or instructions are to be inserted before or during the operation of the computer.

Input by pre-punched paper tape is at the speed at which the reading head has been designed.

Punched card input is at rates up to approximately 14,000

cards per hour, each card capable of carrying a full complement of digits (90 for the 90-column card, 80 for the 80-column card).

Magnetic tape input can be accomplished at high speeds, up to the equivalent of the information contained in 1,000 punch cards a minute. Magnetic tape is prepared in advance from punch cards by a card-to-tape converter at the rate of about 12,000 cards per hour. For small amounts of input or special instructions, data may be placed on magnetic tape by a special device similar to a typewriter.

The purchase cost of a computer (or the monthly rental rate) is related to the type of input and output, or to the speed of operation if there is provision for several types of input and output.

Computers vary in their capabilities. The larger, more expensive machines are capable of doing many more operations and more types of operations than smaller machines. When properly programmed, they can perform the complete computations and produce the report in one pass through the machine. The smaller, less expensive computers can do the same kind of operations but a smaller number of them at one time; consequently the smaller computers may require two, three, or more passes through the machine to accomplish the same results as the large computer.

If you have a million-dollar or two-million-dollar machine available, naturally you try to obtain the complete results in one pass. However, if the computer is the type that rents for $1,000 or $2,000 a month, then the cost of additional passes through the machine to accomplish the same results is relatively small, and the overall cost for the entire job is of the same order of magnitude as the cost of processing on a large computer.

Preparing Programs

For any high-speed computer application it is necessary to prepare a plan of operation and a detailed program of steps required to obtain the desired results. The planning (often called systems design) consists of laying out on paper a flow chart, starting at the point, "This is what I have to begin with," and going through the respective steps to reach the point, "These are the results I expect."

The flow chart graphically presents a series of logical steps in the overall procedure; it forms the basis of the detailed program or code which must be written to have the machine operate properly and accomplish the results. The flow chart becomes the blueprint where changes and additions are to be made during the discussion of the problem. When it has been agreed that the results can be achieved if the steps in the flow chart are followed, it becomes the task of a programmer to convert those steps into the detailed operating instructions for the machine. Special alphabetic and numeric codes distinguish between multiplication, division, subtraction, addition, comparison, extraction, shifting, etc.

Upon completion of the writing of a code, the program must be checked on the machine. The best way to check a program is through a test problem or test deck containing every conceivable combination of data or tests which may be encountered during the actual running of the problem. After the test problem has been set up, the solution is prepared manually step by step to serve as check-points in the actual running of the test on the machine.

During the actual testing of program against the test deck, the results may or may not be obtained. The computer may "hang up," indicating an inconsistency in the instructions. The computer may perform all the operations successfully but the answers may not check with those obtained manually. It is then necessary for the programmer to review the code to find the errors which caused the machine to give a faulty answer.

Some computers have self-checking circuits to perform each operation two ways and compare the answers for each step. If the answers are not equal, the machine stops. Such stops indicate machine failure and the machine cannot continue until the failure is located and repaired.

Examining Input Data

In any computer application it is essential that the input data be accurate and in the form required for processing. Every possible precaution must be taken to eliminate errors: (1) review of basic data; (2) accurate punching of cards; (3) key verifying of cards; (4) if possible, a visual examination of card listings.

When the basic data to be used by a computer are of questionable accuracy or validity, our personnel have an unusual expression —GIGO—to characterize such information and the answers the computer produces. It simply means "garbage in—garbage out." It emphasizes that the results are no better than the data given to the computer.

If there is some question as to the validity of the input data, the programming for computer operations must include some provision for identifying improper and incorrect information and for removing such information from the input data or correcting it before the actual production runs.

In some cases it is desirable to make one complete pass through the machine to check every bit of information to determine whether or not it meets the legitimate codes established, whether it is within the ranges allowed, whether it contains data where data should have been entered, etc.

While some programmers are inclined to accept data as given to them, experience has shown that the time spent on checking input data and removing or correcting errors is time well spent in the entire operation. Some computers, for example, will hang up when they try to process alphabetic data in numeric operations. Other computers will process alphabetic information but will provide answers in unintelligible alphabetic gibberish.

It is good practice to establish some type of control totals from the input data so that checkpoints can be set up before or during the actual processing of the information, and answers may be related to the magnitude of the input control totals.

Application to Origin-Destination Studies

High-speed computers have been used to process origin-destination data collected in a city to determine existing traffic patterns, desire lines, and traffic characteristics to be used in projecting traffic to future years for use in planning and designing highways. Since the amount of data being collected is usually substantial in volume, even after the information has been placed on punch cards the task of obtaining the required results is enormous.

At least five card forms are used in the standard origin-destina-

tion survey as prescribed by the Bureau of Public Roads, and various types of summary data and results must be obtained from each card type. The card volumes run from a few thousand up to a million cards. Because of the variety of information in each card, after one run of a particular card type, the data must be re-sorted for a second series of answers.

Our firm has used three types of computers in processing and projecting O-D data: one accepting as input the data on 90-column punch cards, the second using 80-column punch cards as input, and the third using magnetic tape as input and output.

The capacity of any computer permits a variety of operations at the same time. For example, from the No. 1 Dwelling Unit Interview card containing the answers to questions asked of those interviewed at the dwelling unit visited, selected on a sampling basis from the entire area under study, the computer expanded the data from the sample to the entire area population in one pass, and at the same time produced sub-totals of the following by zone, by district, by county, and for the entire area:

Zone or Area	Number of Dwellings	Number of Persons	Number of Cars Owned	Number of Trips	Number of Persons 5 years and Older	Number of Persons Without Trips

In a second pass through the computer the basic results were used to obtain for each zone, each district, each county and the entire area, the following ratios which were obtained by dividing the respective columns:

Zone or Area	Persons per Dwelling	Cars per Dwelling	Trips per Dwelling	Trips per Person	Trips per Car Owned	Trips per Person 5 Years and Older	Percentage of Persons With Trips	Percentage of Persons With No Trips

As another example, the No. 4 cards summarize truck movements and indicate the number of stops made by each truck in the sample and the number of miles driven that day by each truck in the sample. Besides presenting the expanded summary of trips for all trucks in the area on a zone-to-zone basis, the computer produced the average number of miles traveled per truck, the average number of stops per truck, and the average number of miles per stop per truck, for each selected area of operation.

Similar runs were made for taxis, indicating the taxi movements, the average number of trips per taxi, the average miles per taxi,

and the average miles per trip per taxi. Such information can be related to the standard operating rates for taxi travel in the area, and can be used to support or refute requests for increased taxi fare schedules, re-zoning of the area for taxi travel, or authorizing additional taxi licenses in the area.

From the No. 3 External Trip cards, the computer was able to give a summary of trips passing the external stations at the cordon line. The results indicated zone-to-zone travel, as well as hourly passages through each external station located on major or intermediate roads. Such data can be related to the road capacity for use in future planning because it supplies O-D data and hourly patterns which supplement ground counts made by mechanical means.

Projections to Future Years

The computer can be used to project desire-line data to future years if the economic characteristics of the future years are made available. The basis of the projection must be the characteristics of travel as determined from an actual O-D study.

After projection and distribution of trips on a zone-to-zone basis, a refinement of computed data can be run so that the trips from A to B are approximately equal to those from B to A. Such refinements may be made by several methods. Our firm has used the method of successive approximations to refine the zone-to-zone estimates while keeping the individual zone totals constant. We have performed this operation for several cities, using a 90-column card computer for three successive approximations and 80-column card computer in other three-approximation applications, and a magnetic tape computer for running six successive approximations.

Earthwork Computations

The computer can be used to compute cut and fill requirements based upon rod readings made on the site or based on elevations read from aerial photographs of the terrain. Besides cut and fill, the computer can also indicate the locations of stakes at the respective sections. Depending upon the type of computer used and the

kind of input data, the result can be obtained in one or more passes of the basic data through the machine.

For example, in an application using 90-column punch card computer, one pass converts all rod readings to values in relation to the profile elevation. The second pass computes the cut and fill at the given sections, and gives the stake locations.

Since the criteria for earth-cut differ from those for rock-cut, the program for computation can be divided into sections, or the code can be written so that the distinguishing characteristic will permit the machine to do either computation.

For fill situations, when the amount of fill has to be computed, it is possible to add a compactness factor for the fill if final answers are desired in precise terms.

Curvature Computations

For the design of specific roadways where data have been obtained for the complete highway, it is possible to compute the exact curvature of the road based upon the interpolation of points given at the respective stations. Once the general equation for interpolation has been decided upon, the elements of the equation for interpolation can be entered into the computer and retained so that each successive series of points can be used as input data. The result of the computation will be the points interpolated at desired distances from the given points.

One process of interpolating for such points consists of using a set of five values, making the interpolations between those five values, dropping off the first value and adding the sixth value so that a new series of five may be used for further interpolation. This process is continued until a whole set of points is obtained at specified distances apart.

A similar procedure can be set up for extrapolating points for areas which are inaccessible during the planning stage. The extrapolation formula may be the same as that used for interpolation, or may be one of the many standard forms used in the forecasting of engineering or economic data.

After completion of runs summarizing the surveying results, it is possible to compute cost estimates for the respective portions of a

highway. It is also possible to compute estimated costs for highway materials if the composition of materials is available and if the specific construction characteristics are given for various portions.

Other applications include the asignment of traffic to freeways or other selected highways, the simulation of traffic to determine effects of planned changes, and the design and anticipated performance of automatic signal systems.

Coordination Between Engineers and Statisticians

If engineering personnel are to reap the benefits that can accrue from the use of high-speed computers, it is necessary that the mathematicians and statisticians who do the planning and programming for computer work understand the problem of the engineer precisely, that they have the specific requirements for a finished product or result, and that they know the nature of the input data.

If the engineer presents his problem in a clear and logical fashion, with specific, written requirements, then the computer programming can proceed directly. Whenever the programmer reaches points that need clarification, he must ask the engineer for the required information. If the statistician completes the program and is ready for the test run, he must be sure that it meets all the requirements. Therefore, he must ask the engineer for a test problem or create a test problem himself.

Occasionally, after the program has been written and is ready for a production run, the engineer mentions additional data or codes that he neglected to provide. This oversight forces the programmer to make adjustments or changes in the code, usually called "patching." In transportation language this would be like designing an automobile without providing space for a spare tire. Trying to find space for it would necessitate patching the original design considerably.

It is necessary for any engineer to understand that the task of programming requires anywhere from a matter of days for simpler problems to months where the problem is complex and the computer is required to accomplish many tasks at the same time.

The argument continues between engineering personnel and

programmers as to whether it is better to teach an engineer how to program or to have the programmer learn something about the engineer's problems. Usually an engineer has no time for anything other than the engineering problem he is working on. In that case, time spent in learning to program or in actually programming would mean sacrificing time from his engineering duties. Furthermore, there is no assurance that a good engineer makes a good programmer; a programmer is a programmer because he likes to do that type of work. An engineering problem presented to him in a logical fashion with complete codes and requirements is just another problem.

The programmer does not have to learn engineering to do the computation; rather he must prepare a format and program which will do the computations that engineers have been doing manually for many years.

Planning Our National Park Roads And Our National Parkways

DUDLEY C. BAYLISS

Mr. Bayliss is Chief of Parkways in the Branch of Landscape Architecture, Division of Design and Construction, National Park Service of the United States Department of the Interior, Washington, D.C. Since 1934 his work has been concentrated on the landscape architectural, architectural, and other phases of the national parkways under development by the National Park Service. Previously he spent several months in the same Division assisting with the organization and direction of the Historic American Buildings Survey. He is a member of the American Society of Landscape Architects.

THE basic premise controlling all planning, as well as development and management of the national parks, monuments, and parkways, is embodied in the Act of 1916, which established the National Park Service of the United States Department of the Interior. It is quoted in part as follows:

> The service thus established shall promote and regulate the use of Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

This continues to be the guiding principle of the National Park Service as recently restated by Director Conrad L. Wirth in his Foreword to *Mission* 66:

> Appropriate park use by present and future generations requires preservation and protection of the resources of the parks. But the underlying purpose of national parks, a purpose deriving clearly from the Act of 1916 as well as from the several acts establishing the national parks and monuments, is to yield certain benefits to the Nation and its people. These benefits result primarily from the visitor's experiences in the areas of the System. It is the function of the National Park Service and the objective of the MISSION 66 program constantly to improve the quality of that experience.

Mission 66 is a far-reaching ten-year conservation program for the National Park System, conceived by Mr. Wirth, approved and

recommended to the Congress by the President in 1956. It is intended to provide facilities in the parks for the more than 80,000,000 visitors expected to be using the system by 1966 – fiftieth anniversary year of the establishment of the National Park Service. It will also provide stronger and more effective safeguards for the scenic, scientific, and historic resources of the system. Both the enlarged appropriation for the present (1957) fiscal year and the budget for 1958, provide for carrying the program forward at the recommended rate.

National Park Roads

Landscape architects and engineers of the National Park Service soon learn that it is difficult to follow explicitly the requirements in the basic legislation to "*conserve the scenery*," and "*provide for the enjoyment of same in such manner and by such means as will leave them unimpaired.*"

Anyone who has seen a road built knows that the "dozers" and "cats" are not generally regarded as instruments of conservation. So what is the fine line of distinction, and how far can you go in opening up roads to enjoy the scenic and historic wonders of our country at the expense of destruction of some part of the very thing you are striving to protect?

This conflict of interests has concerned not only the landscape architects and engineers of the service but also the engineers of the Bureau of Public Roads of the United States Department of Commerce, who have, by interbureau agreement for the past thirty years, collaborated on location surveys, preparation of construction plans and contracts and supervision of construction of the major road and bridge projects throughout the 181 national parks, monuments, and parkways now included in the National Park System.

Distinguishing Characteristics

Over the years there have developed between the two Federal bureaus the recognition and acceptance of national park roads as being specialized means of access and circulation that differ, radically in most cases, from the high-speed highways and turnpikes of this era as follows:

1. They are planned to reach the principal features of the park rather than to serve as the most direct route from point to point.

2. They are located and designed to best fit the topography of the particular park rather than to conform to standards of alignment, gradient and curvature which are established for statewide or national application. If possible the road is "laid on the ground" rather than cut through it.

3. Since they are the means by which visitors see and enjoy the park, they are essentially *low speed roads*, and thereby are more readily adapted to being fitted into the landscape with consequent reduction of construction scars.

4. Having as their objective the various points of scenic, historic or scientific importance in the park they are, whenever possible, planned and located to present the story or picture of the park in the best chronological or interpretive order.

5. In the location of new roads or the relocation of old ones, the landscape architect searches out and incorporates all worthy points of scenic, historic or other interest even at the expense of some additional length or nondirectional alignment. Parking areas or turnouts at these and other points of interest are part of the normal construction.

6. All time-tested methods of protecting the roadside slopes and healing cuts and fills, guarding against erosion, are employed, such as flattening and rounding slopes, fertilizing, mulching and seeding, using native plant materials to restore natural appearance, protecting large trees from blasting operations, careful marking of tops of cuts and toes of fills to insure against unnecessary clearing, and locating of borrow pits and quarries out of sight of roads.

7. To obtain maximum and continuing benefits of scenic locations of roads selective cutting and thinning operations help open up views or vistas. Wherever possible canopy type views are obtained by removing the understory and lower branches only, thereby retaining the larger trees and their shade.

Maintenance of the vista is provided by annual mowing or cuting according to a maintenance plan (Figure 1) which defines the various areas and their treatment for mowing, vista maintenance, and does not rely on verbal orders or previous experience.

8. All park development, including visitor centers, administra-

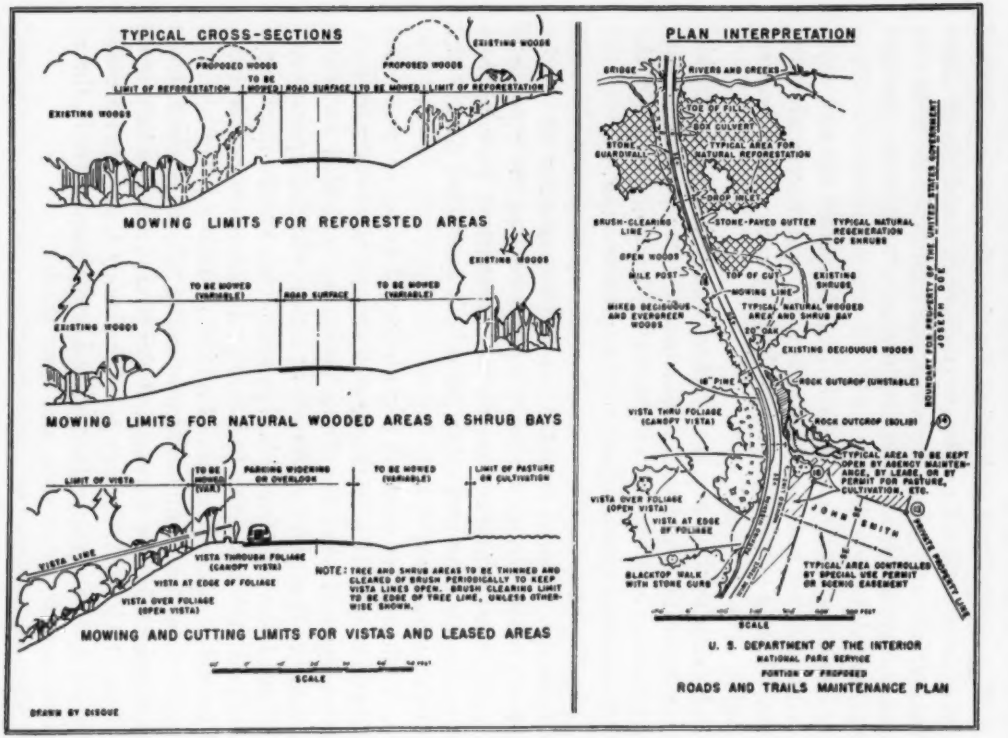
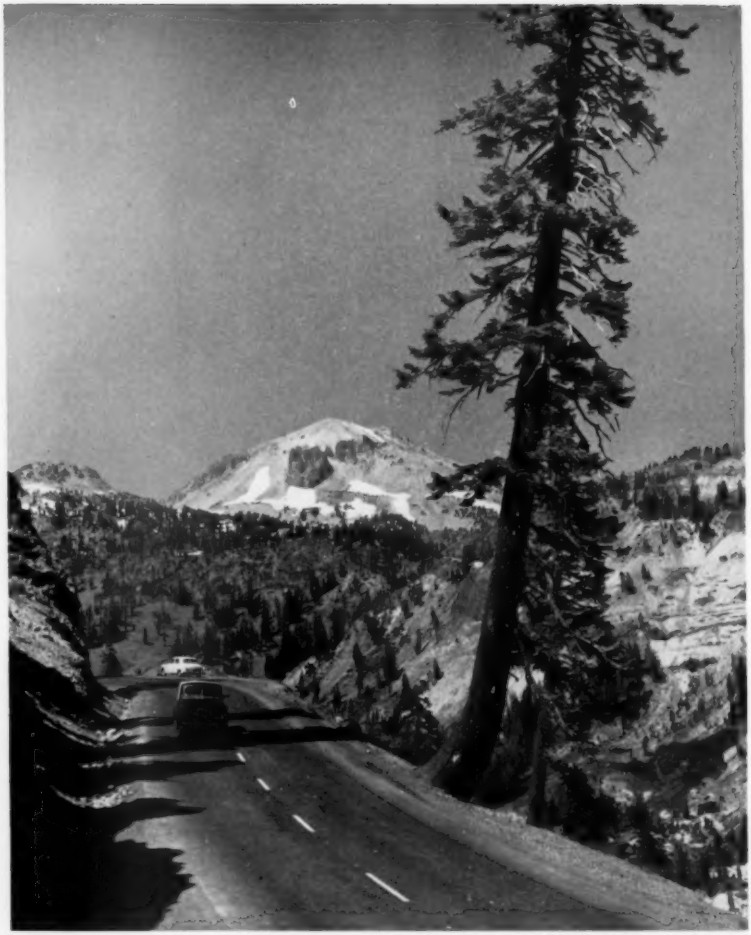
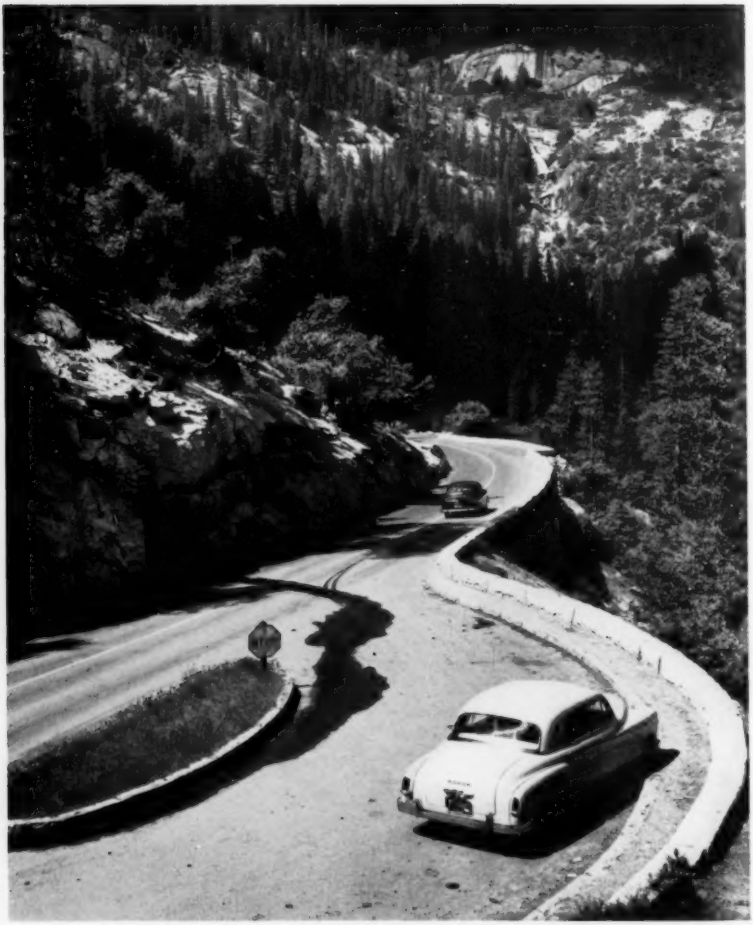

TYPICAL CROSS-SECTIONS
EXISTING WOODS
PROPOSED WOODS
TO BE MOWED
LIMIT OF REFORESTATION
ROAD SURFACE
MOWING LIMITS FOR REFORESTED AREAS
TO BE MOWED (VARIABLE)
MOWING LIMITS FOR NATURAL WOODED AREAS & SHRUB BAYS
LIMIT OF VISTA
PARKING WIDENING OR OVERLOOK
LIMIT OF PASTURE OR CULTIVATION
VISTA LINE
VISTA THROUGH FOLIAGE (CANOPY VISTA)
VISTA AT EDGE OF FOLIAGE
VISTA OVER FOLIAGE (OPEN VISTA)
NOTE: TREE AND SHRUB AREAS TO BE THINNED AND CLEANED OF BRUSH PERIODICALLY TO KEEP VISTA LINES OPEN. BRUSH CLEARING LIMIT TO BE EDGE OF TREE LINE, UNLESS OTHERWISE SHOWN.
MOWING AND CUTTING LIMITS FOR VISTAS AND LEASED AREAS
SCALE
DRAWN BY DISQUE
PLAN INTERPRETATION
BRIDGE
RIVERS AND CREEKS
TOE OF FILL
BOX CULVERT
STONE GUARDWALL
TYPICAL AREA FOR NATURAL REFORESTATION
DROP INLET
BRUSH-CLEARING LINE
STONE-PAVED GUTTER
TYPICAL NATURAL REGENERATION OF SHRUBS
OPEN WOODS
MILE POST
TOP OF CUT
MOWING LINE
EXISTING SHRUBS
MIXED DECIDUOUS-AND EVERGREEN WOODS
TYPICAL NATURAL WOODED AREA AND SHRUB BAY
EXISTING DECIDUOUS WOODS
ROCK OUTCROP (UNSTABLE)
ROCK OUTCROP (SOLID)
VISTA THRU FOLIAGE (CANOPY VISTA)
TYPICAL AREA TO BE KEPT OPEN BY AGENCY MAINTENANCE, BY LEASE, OR BY PERMIT FOR PASTURE, CULTIVATION, ETC.
VISTA OVER FOLIAGE (OPEN VISTA)
VISTA AT EDGE OF FOLIAGE
JOHN SMITH
BLACKTOP WALK WITH STONE CURB
TYPICAL AREA CONTROLLED BY SPECIAL USE PERMIT OR SCENIC EASEMENT
PROPERTY LINE
SCALE
U. S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
PORTION OF PROPOSED
ROADS AND TRAILS MAINTENANCE PLAN

Figure 1. Park and Parkway Road Maintenance Plan



National Park Service Photo

Special protective measures during road construction preserved this picturesque spruce to frame a view of Lassen Peak.



Parking turnout at lower end of uppermost tunnel on Big Oak Flat Road. Looking down. Cascade Creek in background. (Yosemite National Park)

Picnic scene on the Merced River on the south side below the suspension bridge. Cloud's Rest in the background. (Yosemite National Park)

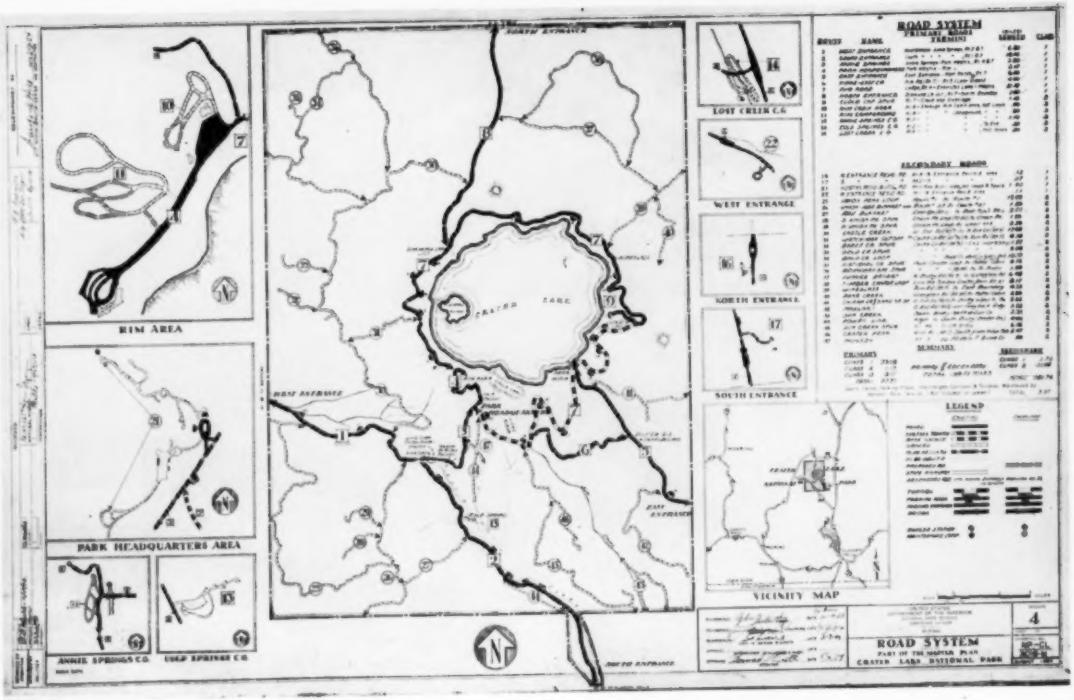


Figure 2. Road System Plan: Crater Lake National Park

tive and maintenance areas, concession and residential areas, and the connecting road system, is controlled by the *master plan* for the park. This is a detailed graphic, as well as narrative plan, which defines the theme or basic importance of the park, the areas to be developed and likewise those to be kept free from development, as well as the method of interpreting the important story or features.

Type of Control

No road construction is undertaken until the system has been studied, carefully planned and delineated in the *plan*. The *road system plan*, one of many parts of the master plan, illustrated in Figure 2, is an example of existing and proposed work in Crater Lake National Park. The benefits of this controlling master plan have been well worth the time and effort expended by the landscape architects, engineers, and other professional and administrative representatives of the service in their preparation. Conceived by Chief of Design and Construction Thomas C. Vint, and adopted by former National Park Service Director Horace M. Albright in 1932, this type of control insures against whims of opinion or varying methods of development brought about by changing administrative or professional personnel and at the same time permits orderly progression of work and revision.

9. The landscape architects' and engineers' ingenuity in blending the roads into the topography through careful location, design and technique of scar-reduction is constantly taxed due to the variety of terrain encountered that ranges from the tundra of Alaska to the rain forests of Hawaii and the Northwest; the High Sierras and Rocky Mountains to Death Valley and the desert, and the rocky promontories of Maine through the eastern Appalachians and the Virginia Capes to the everglades of Florida. No two parks are alike in their demands or their requirements for visitor use.

Collaborative Work

The National Park Service has been fortunate in availing itself of the fine engineering services of the Bureau of Public Roads over the past thirty years. Working together the two bureaus have lo-

cated and constructed roads within most of these 181 parks, monuments, and other gems among America's collection of Crown Jewels.

Some of the outstanding examples of the collaborative efforts in the western parks are the Going-to-the-Sun Highway in Glacier National Park, the Trail Ridge Road in Rocky Mountain National Park, the Rim Drive in Crater Lake National Park, the Stevens Canyon Road in Mount Rainier National Park, and the Tioga Road in Yosemite National Park, the central unit of which is scheduled for completion during the forthcoming fiscal year.

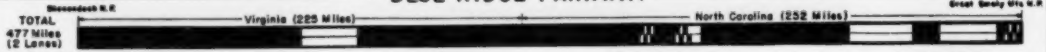
In the eastern portion of the country, the principal large scale projects include the Blue Ridge Parkway, a 477-mile roadway threading the picturesque southern highlands between Shenandoah National Park and the misty folds of Great Smoky Mountains National Park and encompassing with those two areas some 640 miles of continuous mountain road location; and the Natchez Trace Parkway, a 450-mile scenic route connecting Nashville, Tennessee, and Natchez, Mississippi, over the historic Natchez Trace, one of the first post roads in the country, which followed Indian trails and was used by river travelers returning to their homes in Tennessee and Kentucky.

The Bureau of Public Roads has assigned many of its best engineers to the special requirements of national park and parkway work, handled through the bureau's regional offices and the National Park Service eastern and western offices of the division of design and construction. The working procedure is outlined in a document known as the Road Regulations, formerly an Interbureau Agreement, which states the responsibilities and various steps in carrying out the location, design and construction.

Through the thirty years of collaborative effort over $280,000,000 have been appropriated and expended throughout the parks and parkways of the United States and territories in all varieties of topography and climate. Both bureaus have profited from the arrangement which has developed appreciative respect for each other's professional work and a healthy, well rounded result which recognizes the practical and economic considerations in proper relation to esthetics and master plan requirements.

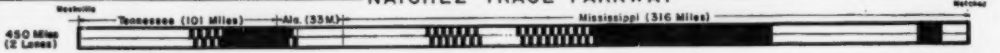
During the early thirties the National Park Service was requested to undertake the development of a national parkway 477 miles in

BLUE RIDGE PARKWAY



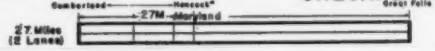
Paving complete or programmed	355.4 Miles	Total estimated cost	$ 90,364,000
Additional grading complete or programmed	24.1 "	Funds available to date	30,243,000
Remaining to be started	97.9 "	Balance necessary to complete	$ 40,121,000

NATCHEZ TRACE PARKWAY



Paving complete or programmed	124.7 Miles	Total estimated cost	$ 97,481,000
Additional grading complete or programmed	90.1 "	Funds available to date	28,910,000
Remaining to be started	235.0 "	Balance necessary to complete	$ 68,571,000

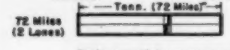
CHESAPEAKE & OHIO CANAL PARKWAY



*Portion authorized by Maryland Legislature

Paving complete or programmed	0.0 Miles	Total estimated cost	$ 7,310,000
Additional grading complete or programmed	0.0 "	Funds available to date	300,000
Remaining to be started	27.0 " (4)	Balance necessary to complete	$ 7,010,000 (4)

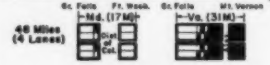
FOOTHILLS PARKWAY



*Includes 4.3 Miles Spur Road between Gatlinburg and Cosby Creek

Paving complete or programmed	1.6 Miles (On spur road)	Total estimated cost	$ 24,146,000
Additional grading complete or programmed	1.9 "	Funds available to date	1,496,000
Remaining to be started	68.8 "	Balance necessary to complete	$ 22,650,000

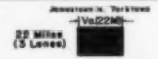
GEORGE WASHINGTON MEMORIAL PARKWAY



NOTE: Maryland and Virginia sections of the Parkway are parallel routes on either side of the Potomac River

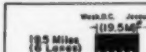
Paving complete or programmed	15.9 Miles	Total estimated cost	$ 57,302,000 (1)
Additional grading complete or programmed	11.4 "	Funds available to date (Inc. $8,000,000 C.I.A. Funds)	13,892,000 (1)
Remaining to be started	21.0 "	Balance necessary to complete	$ 43,410,000

COLONIAL PARKWAY



Paving complete or programmed	22.9 Miles	Total estimated cost	$ 7,648,000
Additional grading complete or programmed	0.0 "	Funds available to date	7,195,000
Remaining to be started	0.0 "	Balance necessary to complete	$ 454,000

BALTIMORE - WASHINGTON PARKWAY



*Includes 19.2 Miles in Maryland & .3 Mile in District of Columbia

15 Miles (6 Lanes)		1.4 Miles (6 Lanes)	
	Paving complete or programmed	18.1 " (4 ")	Total estimated cost (Limitation under PL 413, 82nd Cong.) $ 14,500,000 (2)
	Additional grading complete or programmed	0.0 "	Funds available to date 14,500,000 (2)
	Remaining to be started	0.0 "	

*Includes 19.2 Miles in Maryland
& .3 Mile in District of Columbia

NOTE: Portion of Parkway between Jessup Road and Baltimore has been constructed by the Maryland State Roads Commission

SUITLAND PARKWAY

2 Miles (4 Lanes)		4.9 Miles (4 Lanes)	
	Paving complete or programmed	4.1 " (2 ")	Total estimated cost $ 1,080,000 (3)
	Additional grading complete or programmed	(4.1) " (2 ")	Funds available to date 1,080,000 (3)
	Remaining to be started	0.0 "	Balance necessary to complete $ —

*Includes 6 Miles in Maryland
& 3 Miles in District of Columbia

SUMMARY

1126 Miles	Paving complete or programmed	549.0 Miles	Total estimated cost $ 299,832,000
	Additional grading complete or programmed	127.5 "	Funds available to date 117,416,000
	Remaining to be started	449.7	Balance necessary to complete $ 182,416,000

(1) Not including cost of Mount Vernon Memorial Highway ($ 7,200,000)
(2) Not including wartime expenditures by Bureau of Public Roads ($ 2,000,000)
(3) " " " " " " " ($ 3,000,000)
(4) Based on proposed legislation

Figure 3. National Parkways: Status as of June 30, 1957

length to connect Shenandoah and Great Smoky Mountains National Parks. Thus started under the authority of the National Industrial Recovery Act, this project became known as the Blue Ridge Parkway and has been the forerunner of seven other national parkway projects, now in various stages of development as shown in Figure 3.

National Parkways

Being the first truly rural scenic parkway project of such magnitude in the country, the Blue Ridge Parkway has been the pioneer of a new form of recreational development in the national park system. The techniques of park road location and construction have been utilized, though on an expanded scale, since national parkways are essentially elongated parks, in which the campgrounds, picnic areas, lodges and other visitor services are planned and developed at nineteen locations along the route through Virginia and North Carolina, selected to best fit the topography and the requirements of the project.

Large units of the Blue Ridge Parkway lie within the boundaries of the George Washington and Pisgah National Forests. Through the fine co-operative spirit of the Department of Agriculture and the Forest Service, an agreement of many years' duration provides for transfer of parkway lands to the Department of the Interior and National Park Service jurisdiction as well as protection of additional zones adjoining the parkway. Within these zones, selective timber harvesting operations guarantee the maintenance of the forest as seen from the roadway.

The Forest Service has also acquired and transferred lands necessary for the development of Peaks of Otter, a major scenic and recreational park adjoining the Parkway in Virginia.

In addition to the Blue Ridge Parkway, now about three-fourths complete, the National Park Service is developing seven other national parkways, varying in length from nine to 450 miles. As previously mentioned, the Natchez Trace Parkway, nearing the halfway mark in completion, is the other large scale parkway, traversing parts of Tennessee, Alabama, and Mississippi, in its 450-mile course from Nashville, Tennessee, to the Father of Waters at Natchez, Mississippi.

The Foothills Parkway, living up to its name, will furnish spectacular views of the mighty Great Smokies Range, from its location through the foothills skirting the northern boundary of Great Smoky Mountains National Park for a distance of seventy-two miles, and facilitating access to the campgrounds and other developed areas which are tucked into the coves and hollows at the lower elevations along the perimeter of the Park.

One of the first to be started (1930) and the most recent to be completed, is the Colonial Parkway, extending twenty-two miles from Jamestown to Yorktown, Virginia, by way of Williamsburg. Connecting these three important historic shrines over a scenic route along the James and York Rivers and across the tidewater peninsula, this Parkway was completed in conjunction with the celebration this year of the 350th anniversary of the founding of Jamestown.

In the vicinity of the Nation's Capital, work is proceeding rapidly on the George Washington Memorial Parkway, which will occupy the bluffs on both sides of the Potomac River, from a point above Great Falls, where a new bridge is authorized, to Mount Vernon on the Virginia side and Fort Washington, across the river in Maryland. The Mount Vernon Memorial Highway, designed and built by the Bureau of Public Roads in the early thirties, is an important unit of the Parkway, connecting the Arlington Memorial Bridge and Mount Vernon, Virginia. This parkway has fine scenic qualities, and will, by nature of its location within a rapidly expanding metropolitan area, carry a larger volume of traffic and thus require somewhat different design standards than the rural or mountain parkways. Recreational facilities include picnic areas, boating facilities, nature trails, accesses to the historic Chesapeake and Ohio and George Washington Canals, as well as the usual parking overlooks. Large scale public-use facilities are being developed at Great Falls and Fort Washington, the two termini in Maryland.

Two of the parkways near Washington, the Baltimore-Washington and Suitland, were started as military-access roads and later transferred to the National Park Service for completion after World War II. These are relatively short metropolitan parkways of nine-

teen and nine miles in length respectively, and carry heavy volumes of fast-moving traffic. Since they are so directly interconnected with the Maryland and District of Columbia highway systems, they serve more as traffic facilities than for recreational motoring and hence are being considered for transfer to state jurisdiction.

The Chesapeake and Ohio Canal Parkway project, authorized in 1950, has recently been restudied and legislation is pending to restore the canal and acquire adjoining lands for a National Historic Park including a twenty-five-mile parkway road connection through Green Ridge State Forest near Hancock, Maryland.

Parkway Roads Compared with Park Roads and Highways

In many respects national parkway roads are quite similar to national park roads, except that the parkway location is established to conform to the road route selected, while in national parks the roads are located within areas already established. Parkways thus become elongated parks fitted to the type of countryside and incorporating scenic, historic, and other points of interest.

Compared to state highways, the parkway roads carry no commercial traffic; they are based on the acquisition of wide rights of way, from 800 to 1,000 feet average widths generally, providing a protective area which insures against roadside excrescences such as the bill boards, hot dog stands, taverns, and other fringe developments which infest and destroy ordinary highways. Parkways are also distinguished by their safety features such as grade separation structures; avoidance of cities and towns by means of bypass routes; controlled access, and parallel local or service roads to eliminate the frequent entrances and exits found along ordinary highways. Parkways are located with free flowing alignment to take advantage of the best scenic features of the countryside and to traverse regions of historic or scientific interest so that the shortest route is not the primary consideration as it often is in the case of highways.

Parkways are planned and located to provide the most scenic and pleasant recreational developments en route at widenings in the rights of way, where motorists may stop for a picnic lunch, or in the case of long parkway projects, for overnight camping or

lodge accommodations. The ride-a-while, stop-a-while principle is kept in mind throughout planning and development.

Land Acquisition

The general policy incorporated in federal legislation on national parkway projects is that the states through which the parkway passes, acquire and deed to the United States the rights of way, and the federal government then assumes the responsibility for the construction and maintenance of the parkway road and adjoining recreational areas. This results in a cooperative project with a 90 percent federal and 10 percent state initial cost ratio. Acquisition standards which have been developed over many years are set forth in a brief pamphlet entitled *Requirements and Procedure to Govern the Acquisition of Land for National Parkways*.

The extent of lands to be acquired is based on right of way maps which are prepared by the National Park Service after preliminary surveys have been made by the Bureau of Public Roads on a route selected by joint bureau and service reconnaissance. During the process of land acquisition negotiations are carried on between representatives of the state and the National Park Service to settle problems that result from the necessity for relocation of roads, power lines, telephone lines, the acquisition of residual parcels to eliminate the need for private entrances to the parkway road, and other local problems in the area.

Construction and Development

Following acquisition and transfer of title of parkway lands, units of the parkway road are constructed in economical contract units, generally ten to twelve miles in length, and follow the usual stage construction basis, starting with a clearing, grading, draining and base surfacing contract, followed by contracts for major drainage or grade separation structures, and later paving contracts, each unit requiring from two to three years to complete depending upon the availability of funds.

On long parkways such as Blue Ridge and Natchez Trace the policy is to provide long usable units making connections with exist-

ing state highways in order to best serve public needs. This policy is sometimes difficult to carry out, particularly where the parkway crosses several states en route. Over a period of years, however, it has been successfully applied.

The availability of lands acquired by the state for the parkway forms an important basis in determining the units to be included in a construction program. Construction standards depend on topographic considerations and are generally as high as can be reconciled with reasonable preservation of natural values, providing easy alignment and gradient with good sight distance, making for comfortable driving conditions.

Large parkway projects require individual organizations. In order to provide the necessary right of way maps and construction plans, a staff of landscape architects represent the National Park Service, and a staff of engineers represent the Bureau of Public Roads. In accordance with a long-standing working arrangement, these two groups collaborate on the reconnaissance and location surveys and later on the preparation of contract plans. The National Park Service staff prepares the right of way plans on the basis of a route which is approved by the director. In the case of parkways involving historical or archeological considerations of prime importance, those professions are represented on the parkway staff to collaborate on the early reconaissance work.

The maintenance of the road and right of way, as in other National Park Service areas, is handled by the National Park Service following the completion of construction. During the construction period the Bureau of Public Roads assumes responsibility for maintenance of the roadway proper.

Problems Involved in Planning and Developing Parkways

The problems encountered in planning and developing parkways may be illustrated best perhaps by pointing out situations involved in the progressive development of a particular parkway project. It is assumed in this theoretical case, which is adapted compositely from the parkways now under construction by this service, that the particular project has been authorized by Congress and that preliminary surveys have established its feasibility and desirability.

This is usually accomplished by means of a reconnaissance survey and report approved by the Congress with an initial appropriation following in the annual Interior Department appropriation act.

A. Selection of Route and Rights of Way

1. Scenic considerations are of paramount importance in the selection of any parkway route, following map study, stereoscopic aerial photography study and several scouting expeditions through the country to be traversed. The landscape architect familiarizes himself with all points of scenic value en route whether they be landscape, topographic, or scientific in nature; anything that would afford visual or physical pleasure to the motorist or stimulate his interest in the parkway environment is taken into consideration. If a choice is possible the landscape architect seeks for variation; for example, a route that alternates at intervals between the mountain heights and the open valleys so that the traveler looks up at the mountains occasionally and feels the intimacy of the surrounding countryside rather than constantly peering off the edge of the escarpment at the tiny villages, farms and remote life below. The greater the length of the project, the more important this variety of location becomes. The same type of landscape or location can become monotonous no matter what the locale may be.

2. Other important considerations of selecting a route involve the historic, scientific, and archeological subject matter which may be encountered en route. A long parkway project should unfold a description of regions traversed, so to speak, in which historic structures, Indian mounds, exhibits of local or regional agricultural practices, such as cotton planting, sugar cane production, mountain farming, tobacco raising, reclamation projects, national forests, wildlife or game refuge areas, geological exhibits or sites associated with important military or other historical events are all given proper consideration.

3. Right of way maps are prepared to show the land necessary on which the state or other agency involved bases the acquisition. In selecting the boundaries for the right of way the landscape architect follows a varying course dependent upon several considerations. The general requirement in right of way includes 125 acres per mile of varying width with scenic easements occasionally in lieu

of fee simple acquisition. One hundred and twenty-five acres per mile is the equivalent of 1,000 feet in average width. Aside from the problem of selecting sufficient land to provide for the road construction proper plus scenic control and sufficient buffer area to screen out unsightly developments or unnatural features, the landscape architect must take into consideration the following factors:

(a) Provision of sufficient width to accommodate all grade separation structures with the necessary access roads.

(b) Provision for parallel roads where necessary to accommodate local traffic or to replace existing county or state roads which the parkway location has displaced.

(c) Provision for relocation and possible undergrounding of power, telephone, or other overhead wire crossings.

(d) Elimination, insofar as possible, of adverse residual parcels of land on one side or the other of the parkway road, thus eliminating the need for the former owner to cross the parkway land and motor road in his daily agricultural work.

(e) Conserving sufficient acreage within the 125 acres per mile total to provide widenings required for recreational, food, and service station facilities at proper intervals, as well as for maintenance and utility purposes. This is accomplished by reducing the width of the right of way as much as possible to accommodate the items listed above and then widening at strategic points to take in an entire mountain top or range for example, where the lands will be sufficient to accommodate picnic and parking areas, campgrounds, trailer areas, coffee shop, gasoline stations, lodge and overnight developments, plus utility buildings, shops, warehouses, and equipment storage space.

(f) Economic considerations, involving the reduction in width to the minimum possible consistent with safety and protection of the parkway motorist through expensive agricultural lands or through suburban areas. Routes are selected to bypass, by as wide a distance as possible, metropolitan centers, but occasionally it is necessary to pass through the suburban surroundings of these built-up centers of population.

(g) Where justified, the substitution of scenic easements, freezing the rural picture and uses of land instead of fee simple acquisition.

B. *Establishing State Relations*

An important and ever-present problem is the establishment and maintenance of relations with the state agency responsible for the acquisition and transfer of rights of way.

1. The state highway department is usually designated as the agency responsible for parkway land acquisition. The initial difficulty arises in selling the parkway type of development to the state highway department, which agency is accustomed to acquiring only the right of way necessary for actual road construction purposes. It has been only in recent years, since wider rights of way for state highways have been accepted generally, that any sympathetic response has been made to the width of rights of way necessary for national parkway development. Even now it remains very difficult to convince some state highway right of way officials that the parkway type of development requires much greater width, limitation of access, and separation of traffic than for highway projects.

2. *The Requirements and Procedure to Govern the Acquisition of Land for National Parkways*, which have been approved by the Secretary of the Interior, serve as the basis for acquainting the state right of way agency with parkway land requirements and the general theory of parkway design and construction. These standards set forth briefly the theory and practice of parkway development and suggest means and methods of expediting the transfer of necessary lands through designation of a central state agency, and passage of desirable legislation to accomplish the various objectives in the parkway program.

3. A working procedure on land acquisition and transfer is also outlined in the *Requirements and Procedure to Govern the Acquisition of Land for National Parkways*. This procedure states the method of providing location and right of way maps, type of deeds necessary, provisions for access and frontage rights, replacement of public and private roads, power lines, and other problems incident to right of way acquisition.

C. *Design of the Parkway Road*

1. In general, problems involved in the design of the roadway proper are similar to those encountered in any park area. The

National Park Service landscape architect works closely with the Bureau of Public Roads engineer in the matter of a location survey in which the controls are selected which establish elevations at mountain gaps, stream crossings, intersections with highways and other public roads, and other topographic factors which actually determine the course of the road through the country.

One of the main points of difference between the parkway type of road and the ordinary highway is that the parkway does not necessarily follow the most direct or economical location, based on the premise that it is a recreational type of road which aims to unfold the most interesting and scenic aspects of the country. As may be surmised, in the early days this developed interesting problems in working out the location with the engineers who, through training and experience on highway work, were justly concerned primarily with cost and directional factors and were not usually sympathetic to the provision of a wide panoramic view for example, in lieu of a through-cut. The latter, of course, would save both mileage and construction costs, but would deprive the vacation motorist of a benefit he should receive. Similarly the advantages of gently curving alignment over beeline tangents have always been subject to careful study from the standpoint of comparative costs and directionality.

Over a period of eighteen years of parkway construction and development, the service and the bureau have reached what we believe to be a fair point of equilibrium in which the elements of pleasure, safety and economy are given the proper weight and consideration in the final construction plans. In that period there has developed a mutual appreciation of these elements, together with the realization that the parkway road is essentially for pleasure driving in contrast to the utilitarian uses normally ascribed to the highway. The trend in recent years is swinging toward curvilinear alignment, controlled access, variable medians and grades for separated roadways, and wider rights of way for the more advanced highways as well as parkways. These are proven values of permanent nature which contribute to the pleasure and safety of the motorist and the economy and permanence of the project. While many of these benefits have been confined to national parkways in the past there is heartening reason to believe they will be-

come standards for all major highways as time goes on. All highway and parkway users are entitled to them.

2. Along with the physical controls established by mountain passes or elevations, river crossings, etc., comes the problem of selecting sites for development areas to include overnight facilities, camp and picnic grounds, gasoline and motor service stations, provisions for meals and the storage of road maintenance equipment. On projects 500 miles in length, for example, it must be assumed that many vacationers will find it desirable to spend several days en route. Proper provision must be made for their accommodation, particularly where the nearest towns or facilities are too far from the parkway road.

The problem of patrolling and maintaining contact with parkway neighbors over a project of such size has led to many complications not ordinarily experienced in most park areas. In the matter of communication, for example, it has been found necessary to utilize the latest type of radio communication system in order that weather conditions, fire locations, traffic violators, and other swiftly moving or widely separated events may be reported and acted upon promptly.

The location of recreational and maintenance facilities in areas remote from towns or villages develops problems of employee housing and provision of water, sewage disposal, and electric power systems.

3. Road design is based on moderate rather than high speed, and the highest standards of flowing alignment and grade possible in the type of country being traversed, consistent with the least possible disturbance of the existing natural features and landscape. Road slopes are flattened to a point of unquestionable stability which, in addition to reducing the "man made" look, eliminates many erosion and drainage problems and reduces maintenance costs such as gutter and ditch cleaning, which for the most part, are caused by insufficient slope stabilization.

High standards of safety are incorporated in the road design, including good sight distance on vertical and horizontal curves, through tunnels and over bridge structures; grade separation structures at all railroad and major road intersections; parking overlooks and widening at preselected points; guardwall and guardrail,

center striping of the roadway, standard traffic signs and markers; and mile posts to assist in location of the traveler on the road and identification of natural features en route.

The combination of all these design and safety standards makes it possible for the parkway traveler to relax from the tensions of ordinary highways and enjoy his driving experience on the parkway with reasonable observance of the scenic beauty of the countryside. The elimination of commercial traffic from the parkway road also contributes greatly to the comfort and safety of the parkway motorist.

Limitation of access points adds greatly to the safety of the parkway. Local roads which cross the parkway at several locations are relocated by means of parallel roads along the outer boundary of the parkway right of way to single crossings at certain selected points where access and visibility are good. The parkway crossing is made, preferably by means of the grade separation structure, with no access from the local roads. If access is necessary, it is accomplished by means of a well-located access road. Adjoining owners enter the parkway only at these widely spaced entrances. Needless to say, this provision eliminates from the parkway road the dangers and annoyances of uncontrolled commercialism found in the ribbon or fringe developments which are the ultimate nemeses of ordinary highways.

D. *Construction*

1. Construction of the parkway road and structures is for the most part through competitive bidding by contractors under collaborative supervision of the Bureau of Public Roads and the National Park Service. The Bureau of Public Roads provides engineering services on surveys and plans, and supervises construction with collaboration by the National Park Service on all landscape and architectural phases of the work. Work is undertaken by stage construction in which the clearing, grading, and base surfacing are usually included in the first contract of ten to twelve miles in length. These grading contracts are often under construction over a period of two years due to the large amounts of material to be moved and the difficult construction through mountain areas in many cases, involving shut-downs during the winter season. Problems encoun-

tered are those common to all construction jobs in which the contractor is bound by the terms of the contract and the plans and specifications. This includes interpretation of many items in the plans and specifications which are resolved by the Bureau of Public Roads project engineer and the resident landscape architect working with the contractor's representative on the project.

Principal construction problems from the National Park Service standpoint are the preservation of the natural landscape through supervision of clearing and limitation of blasting; prevention of disposal of rock and excavation to disfigure natural stream beds or to cause unsightly fill-slopes; selection of stone for drainage and bridge structures; selection of quarries and borrow pits out of sight of the parkway or other public roads; avoidance of unnecessary cutting of trees which might be saved close to the road proper through the use of tree protection or through careful construction methods; placing of the contractor's road camp in a location within the right of way which can later be restored to its former condition with little or no damage to the natural landscape; maintenance and protection of natural stream beds or lakes insofar as possible through the use of toe walls and hand placed stone embankment.

In succeeding stages of construction the bridge and overpass structures are built, the road is surfaced with its final paving and guardrails, tunnel portals, parking areas, roadside turnouts, and traffic signs are completed. Most of this work is done by contract although there are some projects on which it is most expedient to use day labor under Bureau of Public Roads and National Park Service supervision.

E. *Developed Areas*

Within the adjoining parks or developed areas of a few hundred to several thousand acres, which are ranged at intervals of twenty to sixty miles throughout the longer parkways, the National Park Service through its division of design and construction plans and supervises construction of all roads, trails, visitor centers, utility buildings, and services to concessioner areas. This work is carried out by both contract and day labor according to the most economical method of construction.

Consistent with the established policy on concession develop-

ments in the national parks, the lodges, coffee shops, gasoline stations and other concession buildings are built and managed by private capital in accordance with plans approved by the service.

F. *Management and Maintenance*

1. When the states have transferred sufficient rights of way to the United States to cover several units of the parkway project, problems of protection and management arise which require the services of an administrative staff with the necessary rangers and clerical assistants. There are relations with the state highway department on matters of right of way acquisition, primarily concerned with construction problems. Also local matters on access and rights of abutting owners with regard to water, power, use of roads, drainage, or construction of buildings on abutting land under scenic easement necessitate an administrative organization, patrol of the parkway road following construction and inspection of the parkway rights of way periodically for fire prevention purposes, trespasses on parkway property, violation of parkway regulations against the marring or defacing of natural features, picking of wild flowers or destruction of shrubbery or trees. The rangers cover their assigned districts in easily identified patrol cars and are helpful in furnishing information and general public contacts.

2. The leasing of government lands included in the parkway right of way to adjoining owners has eliminated one of the most serious problems of such an extensive project. A good portion of the parkway right of way includes agricultural lands on which it is desirable to retain the practice of agriculture in order to present a true picture of the adjoining countryside. In order to accomplish this purpose without undue cost and in order to continue the principle of agricultural production immediately adjoining the parkway road, large areas of the parkway land are leased to adjoining owners at a nominal cost and subject to careful regulation to provide proper crop rotation and other principles of good agronomy which will insure a long-time continued maintenance of the agricultural picture from the parkway road.

Similarly other areas carefully predetermined in the early right of way stages are leased for hay production or pasture lands, thus maintaining at low cost the open meadows and pastures with

cattle grazing peacefully within a stone's throw of the parkway road separated therefrom only by a rustic fence of construction long associated with the locality. Negotiation of these leases regularly with the adjoining landowners presents an administrative problem but eliminates at the same time huge maintenance costs and gains friends for the parkway among these owners who thus serve as the maintenance force preserving the agricultural picture.

Maintenance

On adjoining timberlands or lands adjacent to the parkway road which are better suited for return to wooded condition, the maintenance problem is the prevention of fire and insect infestations through constant surveillance and the use of preventatives.

Each parkway has a maintenance organization with equipment and personnel assigned to districts to remove slides and fallen rocks, clean ditches and culverts, replace eroded material, maintain shoulders, repaint the center striping, and all other maintenance operations. Snow removal is not considered to be an important maintenance project inasmuch as those sections of the parkways which are subject to snow conditions are paralleled by valley roads which are available for use during periods of heavy snow. The parkway road is closed to traffic during these occasions.

The campgrounds, picnic areas, parking overlooks, maintenance areas, and other parkway facilities not encompassed within the concession areas are policed and maintained either by National Park Service maintenance crews assigned to the particular area or by maintenance crews assigned to a district including fifty to sixty miles of the parkway road and adjacent recreational areas.

The Great River Road

Initiated through the energy and zeal of the late Albert P. Greensfelder of St. Louis, and deriving from the results of a joint Bureau of Public Roads and National Park Service survey, completed in 1951, with the continued support of a vigorous and capable international planning commission, good progress is being made on the Mississippi River Parkway project. Now known as the Great River Road,

Figure 4. The Great River Road (Mississippi River Parkway)

reaching almost 3000 miles from connections with the Trans-Canada Highway in Ontario and Manitoba through ten states to the Gulf of Mexico, this parkway promises to establish a pattern of international and interstate cooperation with new concepts in parkway development that could well be applied to the interstate system and other important highways throughout the United States and perhaps Canada as well. Figure 4 illustrates the scope of this project.

The Great River Road incorporates all of the principles of national parkway development with a few important variations. It is planned to be administered by the existing state and provincial highway departments, and in the United States, to be financed as a part of the Federal Aid Highway System. Initially about 60 percent of its location would incorporate existing highways along the river which would gradually be converted to parkway character by application of limited access, purchase of wider rights of way generally along the standards of the national system of interstate Highways, and the purchase of outstanding scenic, recreational, historic, natural or wildlife areas including lands for service areas, bluff faces, islands, and other submarginal river lands. (See Fig.5.)

Protection and preservation of the parklike zone on both existing and new location would be insured by this fee simple ownership, which would be supplemented by the purchase also of mildly restrictive easements on adjoining lands up to several hundred feet in width on each side. This would stabilize the agricultural and rural picture as seen from the parkway road at low cost, since only the rights of the adjoining owner to place on these lands structures foreign to the existing farming uses would be bought. Motels, taverns, and other commercial buildings, subdivisions, billboards, automobile graveyards, and trash dumps, would be among the exclusions.*

No restrictions would be placed on the continuation of farming since the object is to save for all time this living landscape of our life and industry – the vast wheat and cotton fields; the waving sugar cane and the pumpkins among the corn shocks; the cattle grazing in pastures; the hay stacks and corn cribs readied for the

* This type of easement, the acquisition of adjoining property owners' partial rights, might be an answer to the current billboard problem on the interstate system.

winter; and always the ever changing panorama of the mighty river.

As sections of the parkway are acquired on new location the initial acquisition would include lands for all parkway features, including motor service areas. Commercial traffic would continue

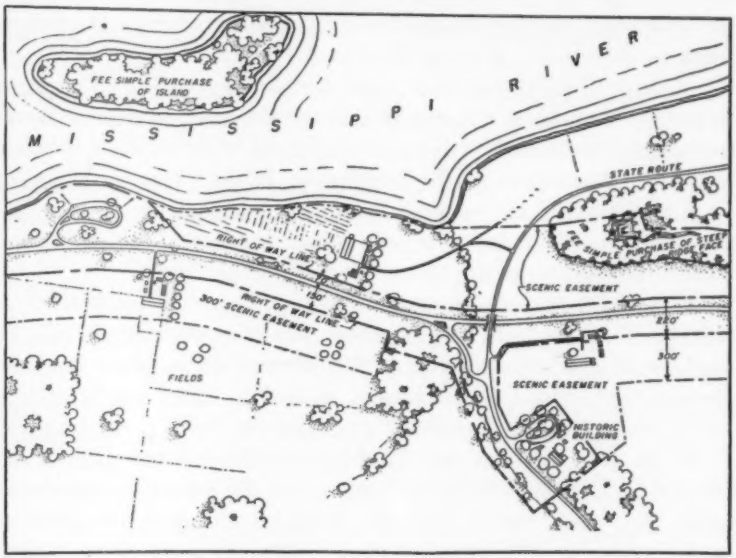


Figure 5. The Great River Road: Parkway Land Controls in Rural Areas

to use the old route. This elastic concept means a gradual conversion to a true parkway geared to each state's desire and ability to participate.

Of most importance in this project is the passage of enabling legislation to permit the ten river states to acquire the rights of way and easements. Once this protective zone is established there is guaranteed forever a parkway clean and clear of any unsightly ribbon development. In accordance with present provisions of the Federal Aid Highway Act, the Bureau of Public Roads and the National Park Service are furnishing advisory planning services to the various river states when requested to do so. A report has been completed recently on the entire 623 miles included in the

State of Minnesota and additional recommendations are currently being made on the detailed location of a scenic portion of the interstate system which has been proposed for the Great River Road location near Minneapolis and St. Paul.

The State of Iowa has requested a complete report on the location through that state. Following that assignment, which is just being started, the consultants are scheduled for additional advisory work in Wisconsin, Illinois, Missouri, and other states.

A draft of proposed state legislation incorporating the suggestions of the two federal agencies and the Highway Research Board to accomplish these objectives has been given to the newly appointed legislative committee of the Mississippi River Parkway Planning Commission, with the expectation that it will help to advance this developed it will include not only ample room for the present and most critical phase of the Great River Road project.

The great national interest in good highways evidenced by passage of the Federal Aid Highway Act of 1956, and the similar public and legislative support of the MISSION 66 program for completing park roads and parkways, as well as other public service needs throughout the national park system, holds great promise.

From both the cost and land-use standpoints our people are entitled to, and can afford the best-connected systems of protected parks, you could say – with safe, gently curving roadways and ample space for additional paving width when needed; permanently planned facilities which will stabilize and improve their surroundings rather than degrade them; sensible and satisfying investments in beauty and utility.